PB86-172400

Superfund Record of Decision (EPA Region 1)
Hocomonco Pond, Westborough, Massachusetts
September 1985

(U.S.) Environmental Protection Agency
Washington, DC

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U.S. Department of Commerce
National Technical Information Service
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Emergency and
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EPA/ROD/R01-85/011
September 1985

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EPA

Superfund Record of Decision:

Hocomonco Pond, MA

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16. ABSTRACT

The Hocomonco Pond site consists of approximately 23 acres, located in the Town of Westborough, Worcester County, Massachusetts, and is bordered on the northwest by Hocomonco Pond. Research into the past activities at the Hocomonco Pond Site indicates that from 1928 to 1946, the site was used for a wood-treating operation by Montan Treating Company and American Lumber and Treating Company. This business consisted of saturating wood products (e.g., telephone poles, railroad ties, pilings and fence posts) with creosote to preserve them. During the operations, wastes were discharged into a pit lagoon (referred to as the "former lagoon"). The lagoon was excavated on the property to intercept and contain spillage and waste from the wood-treating operation. As this lagoon became filled with waste creosote, sludges, and water, its contents were pumped into two depressions, referred to as Kettle Pond, which is located east of the site, near the west side of Otis Street. In addition, site contamination extends into Hocomonco Pond and its discharge stream. The wood-treatment facility operated until the mid-1940s when it was converted into an asphalt mixing plant. Discarded aggregate and asphalt are common throughout the site. The last use of the site was as a cement plant from which dry cement was distributed in bulk.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DS DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Hocomonco Pond, MA Contaminated Media: gw, sw, sediments, soil, wetlands Key contaminants: arsenic, benzo(a)pyrene, cadmium, carcinogenic compounds, chromium, heavy metals, inorganics, organics, phenols, sludge		

18. DISTRIBUTION STATEMENT	**19. SECURITY CLASS** *(This Report)* None	**21. NO. OF PAGES** 219
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SUPERFUND RECORD OF DECISION

Hocomonco Pond, MA

Abstract (continued)

The selected remedial alternative for this site includes: site grading, capping and relocation of the storm drain pipe currently located adjacent to the east side of the former lagoon; for the Kettle Pond area, dewatering the pond and lowering the ground water level in the immediate area, soil/waste excavation based primarily on visible contamination criteria, with additional removal of contaminants based on sampling and analysis of soil conducted during excavation to ensure that contaminated soils are excavated to the extent necessary to ensure mitigation of ground water contamination, and dewatering of sediments with disposal in an onsite landfill; mechanical dredging and onsite disposal of contaminated sediments for the Hocomonco Pond and discharge stream; sealing the storm drain for Otis Street; removal and onsite disposal of contaminated materials at three isolated areas of contamination (soil near Monitoring Well-1, tank bases adjacent to former lagoon, and drain channel sediments at the southwest side of Hocomonco Pond); and air and water quality monitoring and post closure activities consistent with RCRA regulations. Total capital cost for the selected remedial alternative is $2,213,000 with O&M costs approximately $56,000 per year.

ATTENTION

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Record of Decision
Remedial Alternative Selection

Site: Hocomonco Pond
Westborough, Massachusetts

DOCUMENTS REVIEWED:

I am basing my decision primarily on the following documents describing the analysis of the cost-effectiveness of the remedial alternatives for the Hocomonco Pond Site.

- Remedial Investigation/Feasibility Study, Hocomonco Pond Site, Westborough, Massachusetts, TRC Environmental Consultants, Inc., June 1985.
- Summary of Remedial Alternative Selection
- Responsiveness Summary, September 1985.

DESCRIPTION OF SELECTED ALTERNATIVE

Due to the complex nature of this site the selection of remedial action is addressed separately for each area of contamination investigated. The four primary areas are 1.) Former Lagoon 2.) Kettle Pond 3.) Hocomonco Pond and Discharge Stream 4.) Otis Street. In addition, several small isolated areas of contamination will also be addressed.

Former Lagoon

The remedial action selected for the former lagoon area includes site grading, capping and relocation of the storm drain pipe currently located adjacent to the east side of the former lagoon. Operation and maintenance requirements will include water quality monitoring and post closure care consistent with relevant Resource Conservation and Recovery Act (RCRA) regulations. It is anticipated that water quality monitoring can be accomplished using existing monitoring wells.

Kettle Pond Area

The remedial action selected for the Kettle Pond Area consists of dewatering the pond and lowering the ground water level in the immediate area, soil/waste excavation, dewatering of sediments and disposal of sediments in an on-site landfill. An estimated 24,000 cubic yards of material will be removed. This Record of Decision authorizes excavation of the soil/waste to the visible contamination criteria. Further excavation, based on sampling and analysis conducted during the excavation may be necessary to ensure ground water remediation. The final extent of excavation in the Kettle Pond area will be established on approval of the Regional Administrator based on data obtained during the excavation.

Prior to removal of soil/waste from the Kettle Pond, the pond will be dewatered and ground water level will be lowered by pumping. The effluent water will be treated for discharge to surface water and recharge to the aquifer. Prior to the removal of material immediately adjacent to Otis Street (west side) sheet pilings will be placed to insure the stability of Otis Street. During excavation air quality will be monitored. Treatment of air will be provided if necessary. A RCRA landfill will be constructed on site to dispose of the waste material. The siting of the landfill should allow for one contiguous site cap to cover both the landfill and the former lagoon area.

During the excavation of the visual soil/waste contamination, soil and groundwater quality will be evaluated for the types and concentration of contaminants present. The level of groundwater contaminants presently in groundwater is expected to be reduced significantly as a result of the GAC treatment for the dewatering effluent. It may be determined by the Regional Administrator upon completion of this excavation that based on this assessment of soil and groundwater quality, additional soil excavation is necessary beyond that which is visibly contaminated to adequately mitigate groundwater contamination. It may also be determined that the GAC treatment system installed for the dewatering effluent be operated longer to achieve final groundwater quality levels.

Wetland areas impacted by the construction activities will be restored.

Operation and maintenance requirements relative to the on-site landfill will include water quality monitoring and post closure care consistent with RCRA regulations. Water quality monitoring could be accomplished to some extent by using existing monitoring wells.

Hocomonco Pond and Discharge Stream

The remedial action selected for the Hocomonco Pond and discharge stream consists of mechanical dredging and disposal of contaminated sediments, on site. An estimated 2200 cubic yards of material would be removed. Materials would be disposed of on-site, either on top of the former lagoon, in the on-site landfill constructed for the Kettle Pond soil/waste or a combination of both depending on final design considerations related to facility capacity and topography of the facility cap. In either case, operating any maintenance cost would not be involved since operation and maintenance costs are already addressed at these disposal facilities in the discussion of the former lagoon and Kettle Pond alternative.

Air quality monitoring would be conducted during the dredging operation.

Treatment of pond water contaminated by the dredging operation within the controlled (bulkheaded) dewatered work area would be accomplished using the GAC treatment system constructed for Kettle Pond dewatering prior to discharge to surface water.

Otis Street

The remedial action selected for Otis Street consists of sealing the storm drain. Operation and maintenance costs associated with this remedy will not consist of surface water quality monitoring at the drain discharge in Hocomonco Pond discharge stream.

V

Isolated Areas

The remedial actions defined for the three isolated areas of contamination (1. soil near MW-1, (2. tank bases adjacent to former lagoon and (3. drain channel sediments, southwest side of Hocomonco Pond consist of removal of the contaminated materials at these locations and disposal on-site. On-site disposal will be either in the landfill constructed for the Kettle Pond soil/waste or on top of the former landfill (to be capped) depending upon final design considerations related to facility capacity and topography of the facility cap.

Operation and maintenance costs associated with these remedies are addressed in the discussion of the former lagoon and Kettle Pond Area remedies.

DECLARATIONS:

Consistent with the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA); and the National Contingency Plan (40 CFR Part 300); I have determined that the remedial actions selected for the site areas are cost-effective and provide adequate protection of the public health, welfare and the environment. The State of Massachusetts has been consulted. In addition, the remedy will require certain operation and maintenance activities, as described above, to ensure its continued effectiveness. These operation and maintenance activities will be considered part of the approved action and are eligible for Trust Fund monies, on a 90/10% cost share basis with the state, for a period not to exceed one year. I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies at other sites.

Michael R. Deland

September 30, 1985
Date

Regional Administrator, EPA Region I

Hocomonco Pond Site
Record of Decision
Errata Sheet

The first section of this document is not numbered. The location of corrections to be made in the unnumbered section are referenced to major topic heading, subtopic and line number within the subtopic.

DESCRIPTION OF SELECTED ALTERNATIVE

Otis Street	line 3	"remedy will not consist" should read "remedy will consist"
Isolated Areas	line 7	"the former landfill" should read "the former lagoon"
List of Tables	Table 29	"Detailed Cost Extimate" should read "Detailed Cost Estimate"

The location of corrections to be made in the following section are referenced to page and line number. Each printed line on a page should be counted, including section titles, topic headings and subtopic headings.

Summary of Remedial Alternative Selection

page 1	line 25	"forest" should read "foreset"
page 4	line 1	"discharged to an pit lagoon referred" should read "discharged to a pit referred"
page 8	line 2	"areas of former" should read "area of the former"
	line 4	"air monitoring, data" should read "air monitoring data"
page 11	line 19	"approximately 30,000 cubic" should read "approximately 24,000 cubic"
page 14	line 13	"contamininats" should read "contaminants"
page 15	line 15	"location" should read "locations"
page 19	line 12	"were selected" should read "was selected"

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page 22	line 1	"contact and associated receptors are--summarized below" should read "contact--and associated receptors are summarized below"
	line 6	"monitorring" should read "monitoring"
		"volitale" should read "volatile"
page 25	line 7	"value of 1,24003" should read "value of 1.24003"
	line 15	"downgradient form Kettle Pond (i.e. water" should read "downgradient from Kettle Pond (e.g. water"
	line 17	"10^{-2} and 36.63866 are much higher" should read " 10^{-2} and an ADI fraction of 36.63866 both of which are much higher"
page 30	line 23	"Impacts on wetlands" should read "Eliminate impacts on wetlands"
page 34	line 2	"rehability" should read "reliability"
	line 13	"grout curtain); site" should read "grout curtain) with site"
page 37	line 3	"drain relocation." should read "drain relocation (FL-1)"
page 39	lines 16 & 17	"Hocomonco Pond aquatic life." should read "Hocomonco Pond."
	lines 22 & 23	"The various or tasks" should read "The various tasks"
page 41	lines 12 & 13	"include: but not" should read "include but not"
	line 19	"measures to minimize" should read "measures taken to ensure"
	line 23	"surface water" should read "life and surface water"

page 42	lines 5 & 6	"Hocomonco Pond aquatic life." should read "Hocomonco Pond."
page 43	lines 23	"from EPA would be" should read "from EPA would not be"
page 44	lines 12 & 13	"Hocomonco Pond aquatic life." should read "Hocomonco Pond."
	line 18	"site contaminants from" should read "contaminants from"
		"eliminated" should read "eliminate"
page 46	line 5	"are not identified" should read "are no identified"
	line 17	"RCRA incineration" should read "Technical RCRA incineration"
page 47	line 7	"Hocomonco Pond aquatic life." should read "Hocomonco Pond."
page 48	line 10	"treated or disposed" should read "treated or destroyed"
page 49	line 1	"recreations" should read "recreational"
page 50	line 26	"as per EPA" should read "as per EPA standards"
page 56	line 10	"from EPA would be required" should read "from EPA would not be required"
	line 21	"acuaitc" should read "aquatic"
page 57	line 24	"per to for" should read "per ton for"
page 60	line 8	"have had significant" should read "have not had significant"
page 64	lines 14 & 15	"excavated (except associated with storm drain removal), air" should read "excavated air"
page 65	line 22	"treated/disposed" should read "treated/destroyed"

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	line 24	"biodgradation" should read "biodegradation"
page 67	line 17	"RCRA regulations would" should read "RCRA technical requirements would"
page 68	line 5	"dredging unit and turbidity during" should read "dredging unit and turbidity impacts during"
	line 16	"from the dewatering" should read "from the sediment dewatering"
page 69	line 1	"implementaiton" should read "implementation"
page 70	line 4	"possible as previously discussed. Further" should read "possible. Further"
	lines 15 & 16	"restrictions would not be" should read "restrictions would be"
page 71	line 3	"This alternative" should read "If organic desorption from sediments to surface water is determined not to be a problem this alternative"
	line 4	"accidental exposure" should read "accidental ingestion exposure"
	line 16	"environmental concerns" should read "environmental and public health concerns"
	lines 22 & 23	"contamination on aquatic species." should read "contamination in Hocomonco Pond."
page 72	line 6	"treated/disposed" should read "treated/destroyed"
page 73	line 9	"requireed" should read "required"

	line 13	"implementaiton" should read "implementation"
	line 15	"would address" should read "would not adequately address"
	line 18	"RCRA regulations would" should read "RCRA technical requirements would"
page 74	line 5	"would be met" should read "would not be met"
	line 7	"area, should ensure" should read "area, would not ensure"
page 77	line 5	"removal relocation" should read "removal/relocation"
page 79	line 20	"implimentation" should read "implementation"
page 82	line 2	"is not practical" should read "is no practicable"
page 84	line 11	"disposal based" should read "disposal (HP-2). Disposal based"
	line 12	"topography either, on" should read "topography will be either on"
	line 14	"of both (HP-2)." should read "of both."
page 86	line 13	"helath" should read "health"
page 87	lines 6 & 7	"associate risks to the public and aquatic species would" should read "associated risks to the public health and environment would"
	line 11 & 12	"potential of infiltration of contamination" should read "potential contamination"
	line 14	"relaible" should read "reliable"
page 88	line 6	"(refer to" should read " this alternative (refer to"

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	line 20	"provide additional protection" should read "provide adequate protection"
page 89	lines 5 & 6	"public and aquatic species in the Hocomonco discharge stream (Assabet River wetlands) would" should read "public and the environment (i.e. Hocomonco Pond discharge stream and Assabet River wetlands), would"
	line 23	"lagoon to be" should read "lagoon or in the landfill to be"
page 90	line 11	"impacts to aquatic life in Hocomonco" should read "impacts to Hocomonco"
page 91	line 17	"tables in" should read "tables referenced in"
page 92	line 5	"§ 264" should read "Part 264"
	line 10	"Section 264.310 to (a)" should read "Section 264.310 (a) to:"
page 93	line 10	"requirementS" should read "requirements"
	line 11	"264.228 the" should read "264.228, setting out the"
		"standard, required" should read "standard requiring"
	line 23	"closure will" should read "closure care will"
page 94	line 18	"meet" should read "meets"
	line 23	"with of executive order" should read "with Executive Order"
page 95	line 20	"SCC" should read "SSC"
	line 25	"before duration of" should read "before obligation of"
page 96	line 8	"bases, western storm" should read "bases, southwest storm"

page 97	line 3	"(ACL)" should read "(ACLs)"
Tables	Table 40	Total Annual (O&M) cost "15,000" should read "5,000"
		Present Worth "186,000" should read "92,000"
Appendices		
Appendix B		
2nd page	line 1	"action are" should read "action and other alternative actions are"
Appendix D		
1st page	line 21	"action Hocomonco pond" should read "action for Hocomonco Pond"
2nd page	line 25	"topgraphic" should read "topographic"
Appendix F		
1st page	line 5	"quality or Maximum Contaminant Levels (MCL's)" should read "quality, Maximum Contaminant Levels (MCL's) or Alternate Concentration Limits (ACL's)."
	line 14	"The limits" should read "The primary limits"
	line 18	"excavated in a supplemental ROD upon" should read "excavated (supplemental ROD) upon"
2nd page	line 6	"absorption" should read "adsorption"
	line 11	"absorption (K_d) values" should read "adsorption (K_d) coefficients."
	lines 13 & 14	"low distribution coefficients, K_d," should read "low adsorption coefficients (K_d),"
	line 17	"absorption" should read "adsorption"

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3rd page	line 3	"absorption" should read "adsorption"

The above changes shall be incorporated into and made a part of the Hocomonco Pond Record of Decision signed by the Regional Administrator on September 30, 1985.

1/3/86
Date

Michael R. Deland
Regional Administrator, Region I

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The official, double spaced, Record of Decision for the Hocomonco Pond site was approved by signature of the U.S. Environmental Protection Agency Regional Administrator, Region I, on September 30, 1985.

The official document includes an errata sheet approved by signature of the Regional Administrator on January 3, 1986.

Changes to the official document, consistent with the approved errata sheet, have been incorporated in this single spaced edition.

Summary of Remedial Alternative Selection

For

Hocomonco Pond Site

Westborough, Massachusetts

September 30, 1985

U.S. Environmental Protection Agency

Region I

Boston, Massachusetts

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Summary of
Remedial Alternative Selection

Site: Hocomonco Pond, Westborough, Massachusetts

SITE LOCATION AND DESCRIPTION

The Hocomonco Pond Site covers approximately 23 acres. The site is located in the Town of Westborough, Worcester County, Massachusetts (refer to Figure 1). Westborough, a suburban community of about 14,000 people, consists of light industrial, commercial, and residential properties. No homes are located on or border the site. Approximately 40 residential homes are located within one-half mile of the site, principally in the residential area along Fisher Street, south of the site. Several light industries/ manufacturing companies are located within one-half mile of the site. The site is zoned for industrial use. The area land use is shown on Figure 2. The site is bordered on the northwest by the irregularly-shaped Hocomonco Pond. Hocomonco Pond is a 27-acre shallow, warm water pond. Site contamination extends into the pond and its discharge stream.

The regional bedrock geology in the general area of the site is dominated by Precambrian to Ordovician metamorphic rock which dips westwards while striking northeast. These units are cut by younger igneous rocks and several major northeast striking faults. The typical stratigraphic sequence of surficial deposits from base to top at the site consists of 0-40 feet of dense lodgement till under 0-100 feet of delta foreset beds, followed by 0-30 feet of delta topset beds.

The Hocomonco Pond Site is located in the Assabet River Basin. Ground water on-site flows toward and discharges into Hocomonco Pond. Hocomonco drains northeast toward the Assabet River. Several wetland areas are located in the general vicinity of the site (Figure 3). The Kettle Pond area wetlands are located on the site between Kettle Pond and Hocomonco Pond. This small (0.1 acre) wooded, swamp-type wetlands is contiguous to Hocomonco Pond and is occasionally inundated. Hocomonco Pond, the contiguous wetlands, the discharge stream and part of the Otis Street site area are in the base (100 year) floodplain of the Assabet River as defined by the HUD floodplain management maps. Kettle Pond itself is not regulated by the U.S. Army Corps of Engineers (COE) under Clean Water Act Section 404. However, Kettle Pond is considered for the purposes of Executive Order 11990 as a wetland area lying outside of the base (100 year) Assabet River floodplain.

The wetland contiguous to the inlet stream to Hocomonco Pond is an approximately 8-acre wooded wetland. The stream which flows through the wetland originates to the north of Hocomonco Pond near Otis Street.

The Assabet River wetland is a large, wooded wetland located to the northeast of Hocomonco Pond. The floodplain type wetland is approximately 70 acres in size (area delineated on Figure 3) and is contiguous to the Assabet River and the Hocomonco Pond discharge stream. The COE has determined that Hocomonco Pond and the contiguous wetland are under its jurisdiction.

The Otis Street municipal well, a significant factor in the site listing and matter of public concern, is located approximately 2000 feet northwest of the site, on the opposite side of the Hocomonco Pond. The location of this well is shown on Figures 1 and 9.

The results of the Remedial Investigation/Feasibility Study (RI/FS) indicate that hydrogeologic conditions in the Hocomonco Pond area would prevent the migration of contamination from the identified sources to either the Otis Street municipal well, northwest of the pond, or to the Smith Valve process well to the west. The location of Smith Valve Company well is shown on Figure 9. Hocomonco Pond provides a constant head boundary that prevents ground water flow to the water supply wells from the contaminant sources. The lack of contaminants in samples from these wells supports the conclusion that contaminants are not migrating to these wells. Furthermore, the Otis Street well is currently being operated at 350-400 gpm, which is the recommended pumpage rate previously defined to limit the radius of influence from intersecting Hocomonco Pond.

SITE HISTORY

Source History

Research into the past activities at the Hocomonco Pond Site indicates that from 1928 to 1946, the site was used for a wood-treating operation by Montan Treating Company and American Lumber and Treating Company. This business consisted of saturating wood products (e.g., telephone poles, railroad ties, pilings, and fence posts) with creosote to preserve them. During operations, wastes were discharged to a pit referred to herein as the "former lagoon." The lagoon was excavated on the property to intercept and contain spillage and waste from the wood-treating operation. As this lagoon became filled with waste creosote, sludges, and water, its contents were pumped to two depressions located east of the operation near the west side of Otis Street. These depressions are referred to as the Kettle Pond.

The actual wood-treating operations were situated on a bluff above the south shore of Hocomonco Pond. A site layout map illustrating the wood-treating operation is shown on Figure 4. Figure 4 is based on interpretation of historic aerial photographs and site data.

The wood-treatment facility operated until the mid-1940s when it was converted to an asphalt mixing plant. Discarded aggregate and asphalt are common throughout the site. The last use of the site was as a cement plant from which dry cement was distributed in bulk. Smith Valve Company purchased the property of the former operations, on April 2, 1976, and currently operates a manufacturing plant on a separate parcel on the southwest shore of Hocomonco Pond.

Available information indicates no creosote was used or stored on the site by any person who owned or occupied the site after March 26, 1946.

NPL Listing-Chronology of Events

Former Lagoon Area

In 1976, a storm drain was installed to collect surface drainage from the Smith Parkway (south of the site) and to contain a small watercourse which passed through the property. The culvert was located adjacent to the eastern limits of what is now known to be the area of the former lagoon (refer to Figure 4). At the order of the Westborough Conservation Commission, the storm drain pipe was laid with open joints. During periods of heavy rain, water passing through this open-jointed storm drainage system to Hocomonco Pond was observed to be contaminated. Subsequent attempts to seal the joints in the storm drain pipe were unsuccessful. On several occasions from 1979 through the present, creosote has been contained by and collected at the oil boom located in the Hocomonco Pond at the drain channel discharge.

Hocomonco Pond

On November 21, 1979, the Division of Fisheries and Wildlife investigate a fish kill report at Hocomonco Pond. Another fish kill was investigate on April 16, 1982; both kills were reported to be attributed to creosote from the storm drain that passes next to the former lagoon.

Several other studies and investigations were made between the years 1979 and 1982 to evaluate the source and extent of creosote and to investigate methods of removing and/or containing creosote contamination on the site.

Water from Hocomonco Pond was sampled by the Massachusetts Department of Environmental Quality Engineering (DEQE) in July and August 1982. A sample of the oily fraction of the storm drain discharge contained several contaminants at concentrations above 1 ppm: phenanthrene, naphthalene, anthracene, pyrene, fluoranthene, and phenol. Water from the storm drain contained six contaminants, anthracene, phenanthrene, and fluoranthene being the most prevalent.

Kettle Pond and Otis Street

During the reconstruction of Otis Street (1983), it was necessary to excavate soil adjacent to the Kettle Pond. As a result of the excavation, contamination in the Kettle Pond was disturbed. Contaminated soil was redistributed within the roadway embankment on the Kettle Pond side (west side) during reconstruction.

In July 1983, the EPA Region I Field Investigation Team (FIT) obtained water, soil, and sludge samples from the area of road improvement on Otis Street. The samples were collected in order to assess the risk associated with the road reconstruction through this area of former creosote disposal. Results of this investigation showed that contaminants found in sludge samples obtained near the Kettle Pond and the Otis Street reconstruction areas were consistent with those commonly associated with creosote and creosote by-products.

As a result of the extent of creosote contamination detected at various locations in the Hocomonco Pond area and the possible threat of contamination affecting the Otis Street municipal well the site was evaluated, ranked and placed on the National Priority List. In 1984, the United States Environmental Protection Agency authorized a remedial investigation to define the source, extent and character of the site contamination.

CURRENT SITE STATUS

Remedial Investigation

During the remedial investigation four primary areas of contamination were defined. Site contamination can be summarized as occurring in the following general locations (refer to Figure 5): 1) the former lagoon area, 2) the Kettle Pond area, 3) Hocomonco Pond and its discharge stream, and 4) Otis Street. Three other small isolated areas of contamination were also located: (a) tank bases from the treating operation near the former lagoon (refer to Figure 4) which appear to contain creosote by-products; (b) contamination in shallow soils near monitoring well MW-1 (refer to Figure 5); contaminated sediments near a culvert in the drainage channel which discharges on the southwest shore of Hocomonco Pond (refer to Figure 5). The extent and character of contamination at the various Hocomonco Pond site locations was defined during the Remedial Investigation by means of air monitoring, test pits and surface soil sampling, surface water and sediment sampling, shallow and deep borings and monitoring wells. The location of the various sample points, borings and wells are shown on Figures 6 through 9.

Although considerable sampling was done, the data obtained during the RI did not provide evidence to confirm the 8000 gallon spill reported to have occurred on-site (refer to Figure 4) in 1943. A discussion of the extent of the contamination in these areas is provided below.

Former lagoon area: The areal extent of contamination associated with this area is shown on Figure 5. The results of sampling program conducted in the areas of the former lagoon are discussed below.

Air Quality - Available air monitoring data obtained with an organic vapor analyzer in the area of the former lagoon (Sample No. 1-10) does not indicate an air quality problem. However, additional air monitoring, particularly during warm weather, is necessary to more fully characterize the air quality at this area. The location of each sample is shown on Figure 6. Sample data is presented on Table 9.

Soil - An evaluation of the soils in the area of the former lagoon was conducted using soil samples, a sediment sample and subsurface samples obtained from exploratory borings and borings drilled for monitoring wells.

The depth of soil contaminated with creosote compounds typically ranges from 5 to 15 feet with isolated depths to 20 feet. Contamination was also detected in the near surface soil in this area. At the sample depth of 3 feet, creosote compound concentrations range from 74,000 to 3,090,000 ug/kg. Creosote compounds in the soil at the 20-foot depth range from not detected (ND) to 7000 ug/kg. The volume of contaminated soil is estimated to be 18,000 cubic yards and is located above the ground water table. Visible contamination was present in the storm drain catch basin located on the east side of the former lagoon.

The location of various sample points are shown on Figures 7, 8 and 9. Tables 1 and 2 summarize the type and concentration of organic and inorganic contaminants in the Former Lagoon Area.

Ground water - Sampling of the groundwater in monitoring wells in the area of the Former Lagoon did not indicate the presence of ground water contamination. The lack of ground water contamination in MW-6 and MW-7, located a short distance downgradient of the former lagoon, was particularly significant. The lack of contamination in the wells downgradient of the former lagoon area appears to be based on the deposition, location of creosote, its migration characteristics, and the hydrogeologic regime. During the test pit and exploratory boring operations, it was observed that creosote product was principally located in the upper 15 feet of the soil, above the ground water level. The test pit and exploratory borings in the former lagoon also showed that significant downward migration of contaminants is being impaired by a relatively impervious layer of sludges and slaked fines at the bottom of the lagoon.

However, several creosote compounds in the ND-7000 ug/kg range were detected in soil at depths of 18-20 feet. Continued infiltration of precipitation into the former lagoon creosote waste could result in the movement of contaminants into the ground water.

Hydrogeologic conditions at this site would prevent any contaminant migration deep into the aquifer at this location. Monitoring well sets MW-6D/MW-6S and MW-7D/MW-7S exhibit an upward ground water flow component (increasing head with depth); hence any contaminant seepage from the lagoon would flow down into the ground water, flow laterally and discharge to Hocomonco Pond.

Kettle Pond Area: The areal extent of soil contamination associated with Kettle Pond is shown on Figure 5. This includes the west bank of Otis Street and the area north of Kettle Pond to Hocomonco Pond. The results of the sampling program conducted in the Kettle Pond area are discussed below.

Air Quality - Available air monitoring data obtained with an organic vapor analyzer in the area north of Kettle Pond (Sample No. 19) does not indicate an air quality problem. Air samples were not obtained at the Kettle Pond itself. However, odors are present at the Kettle Pond during warm weather. Additional air monitoring during warm weather is necessary to more fully characterize the air quality in this area. The sample locations are shown on Figure 6. Sample data is presented on Table 9.

Soil - An evaluation of the soils in the Kettle Pond area was conducted using surface soil samples, a sediment sample and subsurface samples obtained from exploratory borings and borings drilled for monitoring wells. The depth of soil contaminated with creosote compounds extends from the surface to a depth of 20 feet (maximum depth sampled and analyzed). Creosote compound levels in soil range from ND to 483,000 ug/kg at a depth of 0-2 feet to ND to 55,000 ug/kg at a depth of 20 feet. The maximum depth at which visible contamination was observed in the Kettle Pond was 17 feet. Visible contamination was present to a depth of 11 feet on the west side of Kettle Pond in exploratory boring Bx-4. Samples from exploratory boring (Bx-2 and Bx-3) adjacent to the Kettle Pond, on the west embankment of Otis Street, indicate slight to moderate contamination to a depth of 20 to 26 feet. Contamination in test/pit TP-19 extended below the water table which was at a depth of approximately 8 feet. Surface soil samples within this area adjacent to Hocomonco Pond are also contaminated with creosote compounds. The volume of contaminated soil is approximately 24,000 cubic yards. The location of the various sample points are shown on Figures 7, 8 and 9.

Tables 3 and 4 summarize the type and concentration of organic and inorganic contaminants at the Kettle Pond Area.

Ground water - Ground water downgradient of Kettle Pond is contaminated with creosote compounds. The compounds detected in MW-4 are "typical" creosote compounds (acenapnthene, naphthalene, acenaphthylene, fluorene, phenanthrene, dibenzofuran, 2-methylnaphthalene). Phenolic compounds, which constitute the acidic portions of some creosote products, were also identified. Ground water samples taken in this area were also analyzed for priority pollutant metals. Levels for iron and manganese exceeded background levels and secondary drinking water standards. The creosote contamination at MW-4 is a result of the well intercepting ground water flow between the Kettle Pond and Hocomonco Pond, which exhibited a piezometric head gradient which varies from slightly downward to no vertical gradient at this location.

It should be noted that although ground water was not sampled, contamination in test pit TP-19 did extend below the water table.

The location of the monitoring wells is shown on Figure 9. Sample data is presented on Tables 3, 4 and 13.

Hocomonco Pond and Discharge Stream: The extent of contamination in Hocomonco Pond is limited to a relative small area (approximatel 800 x 100 feet) in the southeast section of the pond. Contaminatio in the discharge stream extends to a point approximately 300 feet east of Otis Street. The areal extent of contamination in Hocomonco Pond and the discharge stream is shown on Figure 5. The results of the sampling program conducted in these areas are discussed below.

Air Quality - Available air monitoring data obtained with an organic vapor analyzer in Hocomonco Pond and its discharge stream (Sample Nos. 11-18) indicate air quality problems in several locations. Total organic vapors detected upon agitation of the sediments were, at some sample locations, significantly above background levels. Organic vapor readings were in the range of less than 1 to 95 ppm.

Sample locations are shown on Figure 6. Sample data is presented on Table 9.

Sediments - Sediment samples were taken at various locations in the Hocomonco Pond and the discharge stream. Sediments contaminated with creosote compounds exist along the southeast portion of Hocomonco Pond and in the discharge stream. Within the pond, sediment contamination ranges from ND to 34,000 ug/kg. In the discharge stream sediment contamination ranges from ND to 140,000 ug/kg. Contaminated sediments in the discharge stream were found at a distance of 300 feet downstream of Otis Street; however, a sediment sample taken 1,000 feet downstream of Otis Street was not contaminated. Sediment sample SD-10, collected at the outlet from the storm drain, north of the former lagoon, contained 17 identified and quantified compounds (refer to Table 12) as well as other tentatively identified compounds. The Smith Parkway storm drain system, constructed with open joints, runs adjacent to the former lagoon, which was found to contain creosote contaminated soil. Visibly contaminated water (sheen) discharges from the storm drain after periods of significant rainfall. Leachate is produced as rain infiltrates through the former lagoon area, and subsequently enters the storm drain system. Migration of contaminants via the storm drain is believed to be a principal cause of contamination in Hocomonco Pond and the discharge stream; however, it is possible that some waste resulting from the wood-treating operation may have been disposed of along the banks of the Hocomonco Pond, resulting in contamination along the edge of the pond. Due to the very low solubility of the aromatic compounds associated with creosote, many of the contaminants would be expected to partition to the sediments and not be soluble in high concentrations. The presence of contamination in the sediments indicates such a partitioning has occurred.

The location of the sediment samples is shown on Figure 8. Sample data is presented on Tables 5, 6 and 12.

Surface water - Results of surface water sampling indicate contamination at three locations: SW-51, SW-53 and SW54. Contamination level at SW-53, located at the storm drain channel discharge point at Hocomonco Pond, was higher than the levels at SW-51 and SW-54. Samples obtained at these locations SW-51, SW-53, and SW-54 (oil boom) contained detectable amounts (ND-530 ug/l) of creosote compounds. Surface water quality at these locations is related to the contamination in the storm drain that passes next to the former lagoon area. The presence of the creosote compounds in these samples is due to the infiltration of water into the open-jointed storm drain pipe. Hocomonco Pond surface water is not contaminated beyond the oil boom located at the storm drain channel discharge point at the pond.

It should be noted that although the Hocomonco Pond (beyond the oil boom) and discharge stream waters are not contaminated the potential for contamination of the surface water does exist due to the release of contaminants from the sediments. Contamination (sheen) was observed on the water when sediments were agitated at several air monitoring sample locations (refer to Table 9).

The location of the surface water sampling is shown on Figure 8. Sample data is presented on Tables 5 and 11.

Otis Street: The areal extent of the area defined as Otis Street is shown on Figure 5. The results of the sampling program conducted in this area are discussed below.

Air Quality - Quantitative air monitoring was not conducted in the Otis Street area. However, a creosote odor was noted in the catch basins of the storm drainage system, which runs along the east side of Otis Street.

Soils - An evaluation of the soil in the Otis Street area was conducted using samples obtained from exploratory borings and borings drilled for monitoring wells. Organic contaminants were not detected in the soils on the east side of Otis Street.

The location of the sample points are shown on Figure 9. Tables 7 and 8 summarize the type and concentration of organic and inorganic contamination on the east side of Otis Street.

Ground water - Ground water in wells downgradient (MW-3) of the embankment on the east side of Otis Street contain low levels of contamination. Contaminated ground water at MW-3 is the result of contaminant migration from the Kettle Pond.

The location of monitoring well MW-3 is shown on Figure 9. Tables 7 and 8 summarize the type and concentration of contamination on the east side of Otis Street.

Isolated Areas: The areal extent of the contamination associated with the three isolated site areas - (1 soils near monitoring well no. 1, (2 tank bases adjacent to the former lagoon and (3 drainage channel sediments, is very limited. The location of monitoring well no. 1 and the drainage channel are shown on Figure 5. The location of the tank bases are shown on Figure 4.

> Soil/Sediments - Contamination in the three isolated areas was detected by soil samples obtained from borings drilled for monitoring wells, a sediment sample and, in the case of the tank bases, visual/observation. The concentration of creosote contaminants, in the shallow soils, 0-2 feet, at the monitoring well no. 1 (MW-1) were in the range of approximately 2500 to 9000 ug/kg. The compounds and concentrations detected at MW-1 are presented on Table 10.
>
> The concentration of creosote contaminants in the sediments of the drainage channel located in the southwest section of the site were in the range of approximately 6,000 to 39,000 ug/kg. The compounds and concentrations detected in the drainage channel are presented on Table 12 (SD-58).

General Site Hydrology: Surface water is present on-site in Hocomonco Pond, Kettle Pond (seasonal), a small depression west of Kettle Pond, and in a low swampy area south of Smith Parkway, near monitoring well MW-1. Kettle Pond collects limited surface water runoff and has no outlet; it also intersects seasonal high ground water. During the field investigation it was also noted that water tends to pond in the area of the former lagoon, the result of low, flat topography. The remainder of the site appears to be well drained due to moderate to steep slopes and to relatively permeable soils over the sandy stratified drift. The permeable nature of the soils at the site provide relatively high infiltration potential. Precipitatior on-site ultimately discharges to the Hocomonco Pond or its discharge stream via direct runoff, infiltration, and subsequent ground water discharge, or through storm drain facilities. Ground water level measurements were made throughout the field program to establish hydrogeologic properties at the Hocomonco Pond Site. In the Spring of 1984, ground water elevation data for the shallow (water table) wells were plotted and contoured to construct a ground water contour map. The ground water contours indicate that ground water flows toward Hocomonco Pond.

The hydrogeologic conditions in the Hocomonco Pond area would prevent the migration of contamination from the identified sources to either the Otis Street Municipal well, northwest of the pond, or the Smith Valve process well to the west.

Hocomonco Pond provides a constant head boundary that prevents ground water flow to the water supply wells from the contaminant sources. The lack of contaminants, as determined in the analytical tasks of this investigation, in the Otis Street municipal well, a nearby ground water observation well, and the Smith Valve Process well, further support the fact that contaminants are not migrating to these water supply wells.

Endangerment Assessment

Summary of Public Health and Environmental Impacts

The public health and environmental concerns at the Hocomonco Pond Site are a function of the contaminant concentrations and actual and/or potential exposure routes and receptors. The public health and environmental concerns are addressed in terms of hazard identification, exposure assessment and risk characterization as summarized in the following sections.

Hazard Identification

Based on the results of sampling and analytical program, four primary and three small isolated areas of site contamination have been identified. The areas have been described previously in this document (refer to section on current site status). An analysis of the organic and inorganic contaminants detected within each media (soil, sediments, ground water and surface water) for the various site areas was conducted to identify critical contaminants at Hocomonco Pond.

A list of compounds which pose the greatest health risks, "critical contaminants" was selected through a categorization and ranking process. Organic compounds detected in the site contamination areas were placed in one of three categories: compounds which are known carcinogens, those which are noncarcinogens but have other known health effects, and those which have unknown health effects. Compounds were then ranked (according to toxicity and/or concentration) within each of these categories by media, and critical contaminants were selected.

Known carcinogens are considered to be those compounds which have Cancer Potency Factors (CPF's) published by EPA's Cancer Assessment Group (CAG). The higher the CPF, the higher the potency of a particular compound. Only two organic compounds detected at Hocomonco Pond, benzene and benzo(a)pyrene, have CPF's published by CAG.

Organic compounds which do not have CPF's but have an Acceptable Daily Intake (ADI) value established for other health effects by EPA were placed in the noncarcinogen group. Compounds detected in the Hocomonco Pond area having ADI's are napthalene, phenol, toluene and fluoranthene. The potential health risk for napthalene is greater than the risk for phenol, toluene or fluoranthene. Through a similar selection process, inorganic critical contaminants were determined to be arsenic and chromium. CPF's have been established for these compounds and both compounds have been detected above background concentrations in soil, ground water and sediments. This ranking procedure identifies those contaminants posing the greatest health risk at the site. The contaminants identified as "critical contaminants" for this site are presented on Table 14. Using the CPF and ADI values for "critical contaminants" health hazards can be quantified. Health hazards associated with other site contaminants cannot easily be quantified because of the lack of published standards; however, these contaminants are considered qualitatively to pose a potential health risk. This qualitative potential health risk effectively increases the overall health risk above the risk level that can be quantified using CPF and ADI values. Analytical data developed during the Remedial Investigation show that critical contaminants and other hazardous chemicals now occur in high concentrations in surface soils (< 3 feet), subsurface soils (> 6 feet), ground water, surface water and sediments at some or all of the site contamination areas. The occurence of critical contaminants in the site areas is summarized below:

Former Lagoon Area: Critical contaminants occur over a 1.7 acre area. Critical contaminants were detected in near surface soil and subsurface soils and sediments in the storm drain passing by the area. High concentration of the polycyclic aromatic hydrocarbons (PAH's) occur in the soil samples but not in the ground water samples.

Kettle Pond Area: Critical contaminants occur over approximately 1 acre in the Kettle Pond area. Critical contaminants were detected in subsurface soils, ground water, surface soil, and sediments in the pond. The soil samples, particularly the subsurface samples, show high concentrations of the compounds. The pond sediments and the dried sediments around the edge of the pond show the highest concentrations of all the samples at this location.

Hocomonco Pond and Discharge Stream: Most of the measurements occur along the southeast border of the pond. Critical contaminants were detected in the surface water (at the oil boom), pond sediments and discharge stream sediments.

Otis Street: Critical contaminants were detected at very low concentrations in the ground water. Contamination was not detected in the soil on the east embankment of Otis Street.

In summary, high concentrations of the critical contaminants occur in soil and sediment samples in several locations at the site, while lower concentrations occur in ground water and surface waters.

Exposure Assessment

The potential for receptor exposure at the Hocomonco site, based on actual and potential exposure routes--inhalation, ingestion, and direct contact -- and associated receptors are summarized below.

Inhalation

PAH's generally have low vapor pressure; however, naphthalene (a critical contaminant) found in the soil, sediment, surface water and ground water does have a significant volatilization rate. Air monitoring data indicates volatile organic compounds are released when contaminated sediments are agitated.

In addition to health risks associated with inhalation of volatile PAH's and other organic compounds, there are risks associated with inhalation of dust. Contaminated dust occuring in the air as a result of playing (i.e. throwing dirt, bike riding, motorcycling) or digging either by children or adults presents a health risk.

Unremediated, the site conditions do represent a health risk via inhalation. Worker and community safety precautions will be addressed during design of the remedial actions.

Ingestion

Soil/Sediments - Critical contaminants and other hazardous chemicals are present at ground surface at the Kettle Pond Area, in near surface soils in the former lagoon area and in Hocomonco Pond and discharge stream sediments. Ingestion of contaminated soil represents an actual health risk to anyone digging, playing or otherwise disturbing the contaminated site areas.

Ground Water/Surface Water - Based on water quality data for all well sampling, including the Smith Valve wells and the Otis Street municipal well, only wells MW-3 and MW-4 were found to contain organic compounds. Ground water contamination on site is limited to the Kettle Pond area, and the east side of Otis Street. Critical contaminants were detected in the ground water at MW-3 and MW-4. Ground water contamination represents a potential exposure pathway. Ground water in this immediate area is not currently used as a water supply source.

It has been determined that there are no identified water supply wells downgradient of the site, however; future use of the ground water is a potential exposure pathway that should be addressed. It has been determined that contamination does not migrate to the Otis Street municipal well from any site contaminant areas.

The surface water of Hocomonco Pond and its discharge stream have been found to be free of contamination, with the exception of the area near the storm drain discharge channel and oil boom north of the former lagoon. An exposure pathway and health risk exists relative to ingestion of or contact with surface water near the storm drain discharge channel following periods of rainfall. It should also be noted that agitation of contaminated sediments in Hocomonco Pond, the discharge stream and Kettle Pond presents an actual exposure pathway and health risk via the release of contaminants to the surface water. Agitation of contaminants also results in the release of volatile organic compounds into the air resulting in an actual exposure pathway and health risk via inhalation. Furthermore while swimming restrictions have been imposed at Hocomonco Pond, the extent to which the restriction is enforced is unknown. Definitive data are not available relative to the bioaccumulation of contaminants in Hocomonco Pond aquatic species. Fish sampling for PAH's is required to develop definitive conclusions regarding this potential exposure pathway and associated health risks. This work is currently underway by the Massachusetts Division of Fisheries and Wildlife. Samples have been collected but analytical data is not yet available.

Direct Contact

Direct contact with critical contaminants and other hazardous chemicals resulting from digging or playing in contaminated soil, sediments and surface water is an actual exposure pathway. This would include direct contact, with contaminated surface soils and/or surface water at the former lagoon, Kettle Pond, and Hocomonco Pond and discharge stream sediments. Dermal allergenic and potential carcinogenic risks are typical of creosote compounds.

Risk Characterization

Health risks associated with the contamination at the Hocomonco Pond site were quantified for several exposure scenarios using available cancer potency factor (CPF) and acceptable daily intake (ADI) values.

Based on a quantitative analysis it was determined that ingestion and dermal contact exposure routes represent significant public health hazards which should be addressed.

Calculations based on exposure (ingestion and dermal contact) to critical carcinogenic chemicals in the Kettle Pond area indicate a summed incremental lifetime cancer risk of 1.66×10^{-3}. This value represents a summation of calculated risk values for two carcinogenic chemicals. This risk value is several orders of magnitude greater than the value for which the EPA would recommend remedial action. In addition, calculations based on ADI's indicate a value of 1.24003 for exposure to naphthalene, and fluoranthene, toxic noncarcinogenic chemicals present in high concentrations on the site. Risk associated with an ADI greater than one (1) are considered unacceptable and would trigger remedial action. Additional health risks associated with other critical contaminants in the Kettle Pond area would be expected to increase the overall risk to a level greater than that quantified.

Calculations based on the use (ingestion exposure) of ground water from a hypothetical well downgradient from Kettle Pond (e.g. water from MW-4) indicate an incremental lifetime cancer risk of 2.55 x 10^{-2} and an ADI fraction of 36.63866 both of which are much higher than the values for which EPA would recommend remedial action.

Calculations based on exposure (ingestion and dermal contact) to critical contaminants in Hocomonco Pond soil and sediments indicate an incremental lifetime cancer risk of 2.22 x 10^{-5} and 2.43 x 10^{-5} respectively. The risk values are slightly more than an order of magnitude greater than the value for which EPA would recommend remedial action.

Calculations based on exposure (ingestion and dermal contact) to critical contaminants by swimming in the area of contamination at Hocomonco Pond indicate an incremental lifetime cancer risk of 3.61 x 10^{-6}. this value is slightly higher than the value for which EPA would recommend remedial action. In addition, calculations based on ADI's indicate a value of 1.68459 for exposure to naphthalene and fluoranthene.

Hocomonco Pond Site Security

As a result of contamination at this site, Hocomonco Pond has been closed to recreational use, e.g. fishing, boating and swimming. Signs have been posted. Access to the overall site via the dirt access road is restricted by large boulders blocking the road. Pedestrian access is not controlled. The site is not fenced.

ALTERNATIVES EVALUATION

Remedial Response Objectives

The overall objective of remedial action at the Hocomonco Pond Site is to mitigate or eliminate contamination and environmental and public health impacts. The remedial response objectives for site cleanup are presented below for each area of contamination. The remedial alternatives proposed are for source control remedial action undertaken pursuant to 40 C.F.R. § 300.68(e)(2) which is appropriate in this instance because a substantial concentration of hazardous substances remain at or near the area where they were originally located and inadequate barriers exist to retard migration of substances into the environment.

Former Lagoon Area

The exposure pathways, contaminant migration routes and actual and/or potential public health and environmental impacts associated with this area include:

- Inhalation exposure
- Exposure by accidental ingestion of contaminants
- Direct contact exposure
- Migration of contaminants to Hocomonco Pond and its discharge stream via the storm drain passing adjacent to the contamination area.
- Impacts on wetlands

The objectives of remedial action are as follows:

- Eliminate inhalation, direct contact and ingestion exposure pathways.
- Eliminate the contaminant migration potential to Hocomonco Pond, surface water, and pond sediments (wetlands).
- Ensure ground water contamination does not occur in the future.
- Eliminate impacts on wetlands.

Kettle Pond Area

The exposure pathways, contaminant migration route and actual and/or potential public health and environmental impacts associated with this area include:

- Inhalation exposure
- Exposure by accidental ingestion of contaminants.
- Direct contact exposure.
- Migration of contaminants to Hocomonco Pond and discharge stream surface water via ground water discharge to surface waters.
- Impacts on wetlands.
- Future use of ground water.

The objectives of remedial action are as follows:

- Eliminate inhalation, direct contact and ingestion exposure pathways.
- Eliminate ground water contamination (and resultant surface water contamination) associated with this area of the site which for the purpose of ground water remediation includes the area on the east side of Otis Street.
- Eliminate impacts on wetlands.

Hocomonco Pond and Discharge Stream

The exposure pathways, contaminant migration routes, and actual and/or potential public health and environmental impacts associated with this area include:

- Inhalation exposure.
- Exposure by accidental ingestion of contaminants (sediments and surface water).
- Direct contact exposure.
- Migration of contaminants further downstream of pond and discharge stream.

The objectives of remedial action are as follows:

- Eliminate the inhalation, direct contact and ingestion exposure pathways.
- Eliminate the contaminant migration potential to downstream areas.
- Eliminate future potential impacts to wetlands and fisheries and associated consumptive exposure pathways.
- Enhance futhre recreational usage of Hocomonco Pond.

Otis Street

The contaminated soils in embankment areas of Otis Street, adjacent to Kettle Pond, have been included in the Kettle Pond contamination area for the purpose of evaluation. No contamination was detected in the soil on the east embankment. Trace levels of organic contaminant were detected in the ground water (MW-3). Creosote odor was present in several catch basins of the Otis Street drain system, indicating a potential migration pathway.

The exposure pathways, contaminant migration route and actual and/or potential public health and environmental impacts associated with this area include:

- Inhalation exposure.
- Direct contact exposure (via Hocomonco Pond discharge stream water).
- Exposure by accidental ingestion of contaminants (via Hocomonco Pond discharge stream water)
- Migration of contaminants in ground water from Kettle Pond Area to surface water in the Hocomonco Pond discharge stream.
- Impacts on wetlands.

The objectives of remedial action are as follows:

- Eliminate inhalation direct contact and ingestion exposure pathway
- Insure contaminants do not migrate through the storm drainage system to surface waters.
- Eliminate impacts on wetlands.

Isolated Areas

The exposure pathways, contaminant migration routes and actual and/or potential public health and environmental impacts associated with the three isolated areas of contamination (soil at monitoring well no. 1 (MW-1), tank bases located adjacent to the former lagoon and contaminated sediments in the storm drain channel on the southwest side of the site) include:

- Direct contact exposure
- Exposure by accidental ingestion of contaminants
- Migration of contaminants to Hocomonco Pond (storm drain channel only)

The objectives of remedial action are as follows:

- Eliminate potential direct contact/ingestion exposure pathways
- Eliminate the potential of contaminant migration to Hocomonco Pond surface water and pond sediments.
- Eliminate impacts on wetlands.

Remedial Alternatives Screening Process

The remedial action screening process involves several steps. First, a limited number of alternatives were developed using feasible technologies and consideration of the factors listed in 40 C.F.R. §300.68(e) and (f). Next, an initial screening was conducted for the remedial alternatives developed from feasible technologies.

Several alternatives were eliminated during initial screening. Finally, a detailed analysis was conducted of remedial alternatives remaining after the initial screening.

From the available feasible technologies available for site remediation, a limited number of source control alternatives were developed.

The following categories were considered in the development of these alternatives:

1. Alternative(s) specifying offsite storage, destruction, treatment or secure disposal of hazardous substances at a facility approved under the Resource Conservation and Recovery Act (RCRA). Such a facility must also be in compliance with all other applicable EPA standards (e.g., Clean Water Act, Clean Air Act, Toxic Substances Control Act.)
2. Alternative(s) that attain all applicable or relevant Federal public health or environmental standards, guidance, or advisories.
3. Alternative(s) that exceed all applicable or relevant Federal public health or environmental standards, guidance, or advisories.
4. Alternative(s) that meet the CERCLA goals of preventing or minimizing present or future migration of hazardous substances and protect human health and the environment, but do not attain the applicable or relevant standards.
5. No action.

The alternatives developed for the various site areas are listed below:

Former Lagoon

1. Site grading and capping; and storm sewer lining or relocation
2. Soil/waste excavation and disposal at off-site (RCRA approved) landfill and site grading.
3. Soil/waste excavation and disposal at on-site (RCRA approved) landfill.

4. Soil/waste excavation and on-site incineration.

5. Biodegradation and site grading.

6. No action.

Kettle Pond

1. Site grading and capping

2. Soil/waste excavation and disposal at off-site landfill and site grading.

3. Soil/waste excavation and construct on-site landfill and site grading.

4. Ground water table modification, site grading and capping.

5. Ground water containment barrier, site grading and capping.

6. Biodegradation.

7. Soil/waste excavation and on-site incineration.

8. Ground water pumping and treatment.

9. No action.

Hocomonco Pond and Discharge Stream

1. Hydraulic dredging and sediment disposal/treatment.

2. Lowering water level in Hocomonco Pond and excavating sediment, sediment disposal/treatment.

3. No Action - deed restrictions, usage limitation.

Otis Street

1. Limited soil excavation.

2. Embankment capping.

3. Storm drain sealing.

4. No action.

The remedial alternatives, listed above, were evaluated in an initial screening process using three broad criteria as outlined by 40 C.F.R. §300.68(h).

- Cost: Alternatives that cost an order of magnitude more than other alternatives but do not provide substantially greater public health or environmental benefit, based on response objectives, would be eliminated.
- Effects of the Alternatives: Adverse environmental effects of the alternatives and implementation of the alternatives; the ability of the alternative to achieve adequate control of the source material.
- Acceptable Engineering Practices: Technical feasibility, applicability and reliability of alternative based on site conditions and waste characteristics.

Table 15 summarizes the results of the initial screening process.

The column headings on Table 15 for costs, environmental/public health and technical correlate with the three broad criteria of cost, effects of the alternative and acceptable engineering practices respectively. Alternatives eliminated during the initial screening are listed below. The criteria used to eliminate an alternative is discussed for each alternative listed.

Alternatives eliminated in the initial screening process were: Biodegradation; ground water containment barrier (steel sheeting or grout curtain) with site grading and capping; and ground water table modification.

Alternatives involving biodegradation were eliminated based on "effects of alternative" and "acceptable engineering practices" criteria. Specifically, biodegradation would not achieve adequate control of the source material because biodegradation lacks documentation of PAH degradation. For this reason it is not a feasible treatment for the site conditions and consequently does not represent a reliable means of addressing the problem at this site.

Alternatives involving a ground water containment barrier (utilizing steel sheeting) along with site grading and capping were eliminated based on the effects of alternative and acceptable engineering practices criterion. Specifically a steel sheeting containment barrier could fail to achieve adequate source control due to leakage of contaminants at sheeting joints or deteriorization of the sheets by corrosion. For these reasons it follows that a steel sheeting containment barrier is not an acceptable engineering practice for this location since it is not a reliable means of addressing the problem.

Alternatives involving a ground water containment barrier (utilizing a grout curtain) along with site grading and capping were eliminated based on the acceptable engineering practices criterion. Specifically a grout curtain is not feasible for the site conditions and does not represent a reliable means of addressing the problem. Grout curtains have highly limited applications and are undemonstrated relative to hazardous waste containment.

Alternatives involving a ground water table modification were eliminated based on acceptable engineering practices criteria. The alternative is not applicable due to conditions of the release i.e. contaminated surface soil, sediments and water.

Detailed Analysis

The remedial alternatives remaining after the initial screening were subjected to a detailed analysis based on the following criteria as outlined in 40 C.F.R. §300.68(i):

A. Refinement and specification of alternatives in detail, with emphasis on use of established technology;

B. Detailed cost estimation, including distribution of costs over time;

C. Evaluation in terms of engineering implementation or constructibilty

D. An assessment of each alternative in terms of the extent to which it is expected to effectively mitigate and minimize damage to, and provide adequate protection of, public health, welfare, and the environment, relative to the other alternatives evaluated; and

E. An analysis of any adverse environmental impacts, methods for mitigating these impacts, and costs of mitigation.

A summary of the results of the detailed analysis of the remedial alternatives for each site area is presented on Tables 16, 17, 18 and 19 and is described more fully in the text below. The column headings on Tables 16-19, technical, environmental/ public health, institutional/land use and cost relate to the various detailed analysis evaluation criteria. The summary information listed under the column heading of "technical" relates in part or in whole to the following detailed analysis criteria; items A, C and D as noted above and set forth at 40 C.F.R. §300.68(i)(2). The column heading environmental/public health relates in part or in whole to the detailed analysis criteria D and E. The column heading of institutional land use relates to the detailed analysis criteria D. The column heading of cost relates to item B of the detailed analysis criteria.

Statement of findings, consistent with Executive Orders 11988 and 11990 are included as appendices to this decision document.

Detailed Analysis

Former Lagoon: Five remedial alternatives (listed below) proposed for source control in the area of the former lagoon are discussed in the following sections.

1. Site grading and capping with storm drain relocation (FL-1)
2. Soil/waste excavation with off-site disposal (FL-2)
3. Soil/waste excavation with on-site landfill facility (FL-3)
4. Soil/waste excavation with on-site incineration (FL-4)
5. No action (FL-5)

Site grading and capping (FL-1)

This alternative is effective in preventing waste migration by eliminating surface water infiltration and eliminating the storm drain migration pathway by relocating the drainage pipe. This alternative is particularly applicable for this site contamination area because soil/waste material is located above the ground water table; therefore, leachate is not produced due to ground water flow-through. The various tasks associated with this alternative are indicated on the detailed cost estimate sheet, Table 20.

The useful life of a properly maintained clay/synthetic liner cap is estimated to be greater than 50 years, at which time replacement may be required. Installation of tensiometers below the cap would be recommended to determine leakage to the underlying soil. This would be used to detect required cap maintenance or replacement. Tensiometers determine moisture content of unsaturated soils by measurement of soil tension, thereby detecting cap leakage. The surface cap system is a reliable and well-demonstrated technology which prevents surface water infiltration through the buried waste material. Operation and maintenance requirements are not complex. They include long-term ground water monitoring, cap maintenance, and mowing to maintain grass cover and prevent tree growth. The facility would have to be maintained indefinitely. The area of the site cap would not be available for future development, and deed restrictions would be required.

The capital, cost and maintenance, and present worth costs of this alternative are summarized in Table 20.

There are no identified site conditions or waste characteristics that would adversely impact the implementation or construction of this alternative at the former lagoon area.

The surface cap system and storm sewer relocation would effectively contain the soil/waste material and prevent contaminant migration. However, the soil/waste material to be capped would not be treated or destroyed. Therefore, the cap system must be maintained and monitored indefinitely since in-situ physical, chemical, or biodegradation mechanisms are not expected to reduce the material to a non-hazardous classification for many years.

This alternative would meet the established public health response objectives for the former lagoon area. The potential direct contact and accidental ingestion exposure pathways would be eliminated by the capping of soil/waste material. Compliance with RCRA regulations Section 264.410 concerning landfill closure and post closure and ground water monitoring would be required to ensure the effectiveness of the cap in minimizing or eliminating the migration of contaminants.

Short term environmental impacts during construction would be minimal for this alternative as summarized below:

- Air emissions would be monitored on-site for worker safety and at potential off-site receptor locations. However, because soil/waste material would not be excavated (except as associated with storm drain removal), air emissions should be minimal.
- Proper sediment and erosion controls would be required to minimize potential adverse impacts to Hocomonco Pond aquatic life, wetland areas, and pond and stream surface water quality. Erosion can be easily controlled at this site.

This alternative would meet the established environmental response objectives for the former lagoon area. The relocation of the storm drainage pipe would eliminate the contaminant migration potential to Hocomonco Pond, and the surface cap would insure that ground water contamination does not occur in the future. It would also have long-term positive impact on Hocomonco Pond.

Soil/Waste Excavation; Off-Site Landfill Disposal (FL-2)

Removal of contaminated soil/waste material from the former lagoon area would effectively eliminate site contamination and prevent future potential contaminant migration. The useful life of the remediation with respect to this site is permanent. The various tasks associated with this alternative are listed on the detailed cost extimate sheet, Table 21.

This alternative is a well-demonstrated and reliable method to mitigate contamination at the former lagoon area.

There are no on-site operational and maintenance requirements associated with this alternative. Site soil/waste contamination would be removed from the site. Therefore, land use restrictions at the former lagoon area would not be required for this alternative.

The capital, operation and maintenance, and present worth costs of this alternative are summarized in Table 21.

There are no identified site conditions or waste characteristics that would adversely impact implementation of this alternative at the former lagoon area.

Two levels of clean-up criteria have been evaluated for soil/waste excavation options. The extent of soil removal based on exposure assessment analysis effectively would excavate and dispose of all identified carcinogenic compounds of concern. The extent of soil removal based on visibly contaminated soils would excavate and dispose of all contaminated material, including the identified carcinogenic compounds of concern. Sampling and analysis would be conducted during excavation to ensure that soils are excavated for disposal in accordance with the selected removal criteria.

This alternative would meet the established public health response objectives. This would pertain to both soil cleanup criteria. The potential direct contact and accidental ingestion exposure pathways would be eliminated by excavation and removal of the material from the site.

Hazardous waste handling and disposal permits would be needed for this alternative, including transportation and manifesting requirements. If off-site landfill disposal is selected, only facilities that meet all RCRA regulations can accept the waste. There is a potential regulatory (off-site disposal policy) constraint regarding this alternative.

Short-term environmental impacts during construction are summarized below:

- Air emissions and off-site air quality impacts during site excavation may be significant due to particulates and volatilization of contaminants. A site contingency plan would be required to minimize adverse air impacts and could include but not be limited to: 1) application of temporary foam to the site excavation area when air quality levels approach maximum acceptable concentrations and 2) stopping work and application of permanent foam to site excavation when air quality levels reach maximum acceptable concentrations and recommencing work when levels were reduced below acceptable levels and measures taken to ensure reoccurrence of similar air quality impacts do not occur.

- Proper sediment and erosion controls would be required to minimize potential adverse impacts to Hocomonco Pond aquatic life and surface water quality. Erosion can be easily controlled at this site.

This alternative would meet the established environmental response objectives for the former lagoon area. The removal of contaminated soil/waste material to an off-site RCRA landfill would eliminate the contaminant migration potential to Hocomonco Pond and would ensure that ground water contamination does not occur in the future. It would also have a long-term positive impact on Hocomonco Pond.

Soil/Waste Excavation; On-Site Landfill Facility (FL-3)

As a result of this alternative waste material will be excavated from the former lagoon area and placed into an RCRA landfill facility constructed on-site. This would effectively mitigate site contamination and prevent future potential migration of contamination associated with the former lagoon area. The technical performance of an on-site RCRA landfill is good compared to other containment technologies A redundant double liner, leachate collection and storage, and leak detection system would prevent the migration of contaminants from the landfill. Any leakage would be detected and collected prior to entering the ground water. The useful life of a properly maintained on-site landfill would be greater than 50 years. The exact service life cannot be accurately predicted; however, the in-effect "triple" liner system should provide for long-term waste containment. Site conditions are such that a minimum of 10 feet would exist between the base of the landfill and the ground water table. Long-term ground water monitoring would also be provided. The various tasks associated with this alternative are indicated on the detailed cost estimate sheet, Table 22.

Operation and maintenance requirements for an on-site landfill would be relatively complex. They would include ground water monitoring, facility inspection and maintenance, and disposal/treatment of leachate that may be generated from within the landfill.

Land use restrictions would be required for the area of the on-site landfill; no development would be allowed at the landfill site.

The capital, operation and maintenance, and present worth costs for this alternative are provided in Table 22.

There are no identified site conditions or waste characteristics that would adversely impact the implementation or construction of this alternative at the former lagoon area. The site appears to meet acceptable engineering criteria for landfill siting. A waste compatibility evaluation would be required during design of the liner system.

The level of soil/waste cleanup pertaining to the exposure assessment and visible contamination criteria was discussed previously.

This alternative would meet the established public health response objectives for the former lagoon area. This would pertain to both soil cleanup criteria. The potential direct contact and accidental ingestion exposure pathways would be eliminated by excavation and removal of the material from the former lagoon site to the on-site landfill.

This alternative would have to comply with the regulatory requirements for new RCRA facilities. Permit approvals from EPA would not be required for an on-site landfill. Compliance with the National Pollutant Discharge Elimination System (NPDES) will be achieved if treated leachate is discharged to the pond or town sewer system.

The short term environmental impacts discussed in association with alternative (FL-2) also pertain to the soil/waste excavation and on-site landfill construction activities associated with this alternative.

This alternative would meet the established environmental response objectives for the former lagoon area. The removal of contaminated soil/waste material to an on-site RCRA landfill would eliminate the contaminant migration potential to Hocomonco Pond and would ensure that ground water contamination does not occur in the future. It would also have a long-term positive impact on Hocomonco Pond.

Soil/Waste Excavation; On-Site Incineration (FL-4)

As a result of this alternative waste material would be excavated from the former lagoon area and completely (99.99 percent) destroyed by thermal oxidation during incineration. This would eliminate contaminants from the site and would eliminate the need for re-disposal at another site where future problems could occur. On-site incineration technology is in the testing stage; full-scale operations have not been implemented. A brief summary of the expected performance/reliablity from rotary kiln and infrared incinerators follows. A vendor for rotary kiln incinerators has two operational mobile units (100 TPD capacity). The technology of the rotary kiln incineration is well demonstrated and is used at stationary hazardous waste incinerators. The vendor has incinerated petroleum wastes.

Infrared incineration is a relative new technology that operates by destruction of waste in an infrared furnace. A vendor for infrared incineration has conducted pilot operations at a phenolic resin plant. A full-scale 100 TPD capacity unit is in design, but is not anticipated to be operational until early 1986. According to the vendor, infrared incineration offers greater process control over zone temperature, residence time, and feed rate. However, this cannot be documented until full-scale hazardous waste trial burns are conducted.

Operation and maintenance requirements for incineration are technically complex and require highly trained personnel specifically trained in that area.

The various tasks associated with this alternative are indicated on the detailed cost estimate sheet, Table 23.

Land use restrictions would not be required for this alternative.

The capital, operation and maintenance, and present worth costs for this alternative including the rotary kiln and infrared incinerator technologies are provided in Tables 23 and 24. The reliability of the cost per ton for incineration cannot be verified with any actual construction cost because full-scale on-site hazardous waste incineration has not taken place. Therefore, the cost for on-site incineration is not well-defined and could vary significantly for actual construction. The cost for infrared incineration, provided by a vendor, is significantly lower than that for rotary kiln incineration. Due to the lack of full-scale experience with hazardous waste incineration, this potential cost savings cannot be fully substantiated.

There are no identified site conditions or waste characteristics that would adversely impact the implementation or construction of this alternative at the former lagoon area.

The level of soil/waste cleanup pertaining to the exposure assessment and visible contamination criteria was discussed previously (refer to alternative FL-2). The level of cleanup with incineration is complete because waste contaminants are thermally destroyed.

This alternative would meet the established public health response objectives for the former lagoon area. This would pertain to both soil cleanup criteria. The potential direct contact/accidental ingestion exposure pathways would be eliminated by excavation and thermal destruction of contaminants.

Technical RCRA incineration requirements would be complied with. Also, compliance with the Clean Air Act and NPDES technical requirements would be necessary.

The discussion of the short-term environmental impacts discussed for Alternative FL-2 also pertains to the soil/waste excavation and on-site incineration construction activities associated with this alternative. As previously noted, contaminant destruction efficiency for incineration is 99.99 percent. RCRA regulations would require trial burns at the site to ensure compliance with air quality standards.

This alternative would meet the established environmental response objectives for the former lagoon area. Removal and destruction of contaminants would eliminate potential contaminant migration potential to Hocomonco Pond and ensure that ground water contamination does not occur in the future. It would also have a long-term positive impact on Hocomonco Pond.

No Action (FL-5)

The no action alternative for the former lagoon area consists of 1) fencing the area, 2) ground water quality monitoring, 3) periodic monitoring of the storm drainage discharge from Smith Parkway, and 4) placing a deed restriction on future use of the area. The no-action alternative will not eliminate the migration of contaminants to Hocomonco Pond via the storm drain. It would provide for ground water quality monitoring around the former lagoon area. Ground water quality degradation, if it were to occur in the future, would be detected. The various tasks associated with this alternative are indicated on the detailed cost estimate sheets, Table 25. Significant migration of contaminants from the former lagoon area to pond and stream sediments has occurred over the past 9 years since the storm drainage culvert was installed. Consequently, the no action alternative is not be expected to reliably address the site problems in the future because wastes will exist on-site and a migration route (storm drainage pipe) to the pond will still exist.

The operation requirements of monitoring ground water quality and maintenance of the fence would be minimal. The area of contamination to be fenced would not be available for future development, and deed restrictions would be required. Furthermore, if no action were to be taken at the former lagoon, continued restrictions would be required relative to fishing and recreational activities at Hocomonco Pond.

The capital, operation and maintenance, and present worth costs of this alternative are summarized in Table 25.

With this alternative the waste material would not be contained, removed, treated or destroyed. Therefore, there would be no cleanup of site contaminants. In-situ physical, chemical, or biodegradation mechanisms are not expected to reduce the material to a non-hazardous classification for many years.

Fencing of the former lagoon area is proposed to eliminate the direct contact and accidental ingestion exposure pathways at the site. However, the fence may create an attractive nuisance to children and potentially result in increased activity at the site. Maintaining the site in its current state would not comply with state and federal regulations.

Short-term impacts associated with the fence installation would be negligible. Long-term impacts associated with the no action alternative would be continued migration of site contaminants from the former lagoon area to Hocomonco Pond sediments and discharge stream sediments. Continued migration of contaminants to the pond would increase, due to increase in contaminant concentrations, the ingestion and direct contact exposure potential related to recreational use of the pond i.e. wading or swimming.

Furthermore, the continued migration of contaminants to the pond and discharge stream (and potential further migration to the Assabet River wetlands) represents a negative impact on these wetland areas. Exposure to PAHs by some aquatic organisms through food, water, or sediment contamination has been reported to result in reduced survival and behavioral and reproductive changes.

Kettle Pond Area

Site Grading and Capping (KP-1)

This alternative would not be effective in preventing waste migration at this site. The majority of soil/waste material is located below the ground water table; therefore, leachate is principally produced due to ground water flow-through. Reduced surface water infiltration would not significantly reduce ground water quality degradation downgradient of the site. However, direct contact and accidental ingestion exposure pathways would be eliminated.

The useful life of a properly maintained clay/synthetic liner cap is estimated to be greater than 50 years, at which time replacement may be required. Installation of tensiometers below the cap would be recommended to detect leakage to the underlying soil. This would be used to determine required cap maintenance or replacement. Tensiometers determine moisture content of unsaturated soils by measurement of soil tension, thereby detecting cap leakage. The surface cap is a reliable and well-documented technology which prevents surface water infiltration through the buried waste material. However, as previously noted, it would not prevent waste migration at this particular site. Operation and maintenance requirements are not complex. They include long-term ground water monitoring, cap maintenance, and mowing to maintain grass cover and prevent tree growth. The facility would have to be maintained indefinitely. The various tasks associated with this alternative are indicated on the detailed cost estimate sheet, Table 26. The area of the site cap would not be available for future development, and deed restrictions would be required.

The capital, operation and maintenance, and present worth costs of this alternative are summarized in Table 26.

There are no identified site conditions or waste characteristics that would adversely impact the implementation or construction of this alternative.

The surface cap system would not contain the soil/waste material and would not prevent continued waste migration and resulting ground water quality impacts. However, this alternative would meet established public health response objectives for the Kettle Pond area. The potential direct contact and accidental ingestion exposure pathways would be eliminated by the capping of soil/waste material. Compliance with the technical requirements of RCRA regulations concerning landfill closure, postclosure and ground water monitoring regulations would be necessary. A ground water alternative concentratic limit (ACL) would have to be established and approved as per EPA standards if this alternative were to comply with RCRA standards.

Short-term environmental impacts during construction would be minimal for this alternative as summarized below:

- Air emissions would be monitored on-site for worker safety and at potential off-site receptor location. However, because soil/waste material would not be excavated, air emissions should be minimal.

- Proper sediment and erosion controls will be required to minimize potential adverse impacts to Hocomonco Pond aquatic life, wetland areas, and Hocomonco Pond and discharge stream surface water quality. There is a small wetland immediately downgradient of Kettle Pond within the designated Kettle Pond contamination area. The cap would not extend to this wetland area, and sediment erosion controls would mitigate potential adverse impacts to the wetland.

A long-term environmental impact of capping the Kettle Pond would be the permanent loss of the wetlands.

This alternative would not meet the established environmental response goal of improving water quality downgradient of Kettle Pond. The aquifer in this area is designated as a class II aquifer according to EPA's ground water protection strategy. Furthermore, if ground water discharges to Hocomonco Pond and the discharge stream, adverse environmental and potential public health concerns would exist.

Soil/Waste Excavation; Off-Site Landfill Disposal (KP-2)

Removal of contaminated soil/waste material from the Kettle Pond would eliminate site contamination and present future contaminant migration potential. The useful life of the remediation with respect to this site is permanent. The various tasks associated with this alternative are indicated on the detailed cost estimate sheet, Table 27.

This alternative is a well-demonstrated and reliable method to mitigate contamination at this site.

There are no on-site operational and maintenance requirements associated with this alternative. Site soil/waste contamination would be removed from the site; therefore, land use restrictions at the Kettle Pond area would not be required for this alternative.

The capital, operation and maintenance, and present worth costs of this alternative are summarized in Table 27.

There are conditions at Kettle Pond site which would require implementation of specialized construction techniques. Subsurface steel sheet piling would be required to provide stability to the Otis Street roadway during excavation of Kettle Pond and Otis Street contaminated embankment material. Also, the soil/waste material is currently situated in ground water, and dewatering would be required to allow for excavation in the dry. Water from the dewatering operation would require treatment and disposal. These construction techniques are well-demonstrated, and associated cost factors have been considered.

Two levels of cleanup criteria have been evaluated for soil/waste excavation options. The extent of soil removal based on exposure assessment analysis effectively would excavate and dispose of all identified carcinogenic compounds of concern. The extent of soil removal based on visibly contaminated soils would result in the excavation and disposal of all contaminants including the identified carcinogenic compounds of concern. Sampling and analysis would be conducted during excavation to ensure that soils are excavated for disposal in accordance with the selected removal criteria.

This alternative would meet the established public health response objectives. This would pertain to both soil clean-up criteria. The potential direct contact and accidental ingestion exposure pathways would be eliminated by excavation and removal of the material from the site.

Hazardous waste handling and disposal permits would be needed for this alternative, including transportation and manifesting requirements. EPA has recently directed that if off-site landfill disposal is selected, only facilities that meet all RCRA regulations can accept the waste.

Short-term environmental impacts during construction are summarized below:

- Air emissions and off-site air quality impacts discussed for the former lagoon alternative FL-2 also pertain to this alternative.
- Proper sediment and erosion controls will be required to minimize potential adverse impacts to Hocomonco Pond aquatic life, wetland areas, and Hocomonco Pond and discharge stream surface water quality. There is a small wetland immediately downgradient of Kettle Pond within the designated Kettle Pond contamination area. Sediment and erosion controls would be required to prevent migration of sediments to this wetland. The dewatering system may reduce water levels in the wetland area for the duration of operation (approximately 2 months). No long-term impacts to the wetland area are anticipated.

This alternative would meet the established environmental response objectives for the Kettle Pond area. The removal of contaminated soil/waste material to an off-site RCRA landfill would mitigate ground water contamination downgradient of Kettle Pond by eliminating the source of contamination. This alternative would conform to the goal of ground water quality improvement and comply with EPA's ground water protection strategy.

Soil/Waste Excavation; On-Site Landfill Facility (KP-3)

As a result of this alternative waste material will be excavated from the former Kettle Pond area and placed in an RCRA landfill facility constructed on-site. This would effectively remove the source contamination. The two levels of cleanup criteria discussed for KP-2 also pertains to this alternative. The technical performance of an on-site RCRA landfill is good compared to other containment technologies. A redundant double liner, leachate collection and storage, and leak detection system would prevent the migration of contaminants from the landfill, and leakage would be detected and collected prior to entering the ground water. The useful life of a properly maintained on-site landfill would be greater than 50 years. The exact service life cannot be accurately predicted; however, the in-effect "triple" liner system should provide for long-term waste containment. Site conditions are such that a minimum of 10 feet would exist between the base of the landfill and the ground water table. Long-term ground water monitoring would also be provided. The various tasks associated with this alternative are indicated on the detailed cost estimate sheet, Table 28.

Operation and maintenance requirements for an on-site landfill would be relatively complex. They would include ground water monitoring, facility inspection and maintenance, and disposal/treatment of leachate that may be generated from within the landfill.

Land use restrictions would be required for the area of the on-site landfill; no development would be allowed at the landfill site.

The capital, operation and maintenance, and present worth costs for this alternative are provided in Table 28.

There are conditions at Kettle Pond site which would require implementation of specialized construction techniques. Subsurface steel sheet piling would be required to provide stability to the Otis Street roadway during excavation of contaminated material from the Kettle Pond and Otis Street (west embankment) areas. Since the soil/waste material is currently situated in ground water, dewatering would be required to allow for excavation in the dry. Water from the dewatering operation would require treatment and disposal. These construction techniques are well-demonstrated, and associated cost factors have been considered.

This alternative would meet the established public health response objectives for the Kettle Pond area. The inhalation, direct contact and accidental ingestion exposure pathways would be eliminated by excavation and removal of the material from the Kettle Pond site to the on-site landfill.

This alternative would comply with RCRA regulatory requirements and with respect to the construction of a landfill, this would assure adequate protection to the public health, welfare and the environment. Permit approvals from EPA would not be required for an on-site landfill. Compliance with the technical requirements of the National Pollutant Discharge Elimination System (NPDES) would be necessary if treated leachate were discharged to Hocomonco Pond or the town sewer system.

Short-term environmental impacts during construction are summarized below:

- Air emissions and off-site air quality impacts discussed for the former lagoon alternative FL-2 also pertain to this alternative.
- Proper sediment and erosion controls will be required to minimize potential adverse impacts to Hocomonco Pond aquatic life, wetland areas, and pond and stream surface water quality. There is a small wetland immediately downgradient of Kettle Pond within the designated Kettle Pond contamination area. Sediment and erosion controls would be required to prevent migration of sediments to this wetland. The dewatering system may reduce water levels in the wetland area for the duration of operation (approximately 2 months). No long-term impacts to the wetland area are anticipated.

This alternative would meet the established environmental response objectives for the Kettle Pond area. The removal of contaminated soil/waste material to an on-site RCRA landfill would mitigate ground water contamination downgradient of Kettle Pond by eliminating the source of contamination. This alternative would conform to the goal of ground water quality improvement and comply with EPA's ground water protection strategy.

Soil/Waste Excavation; On-Site Incineration (KP-4)

A discussion of the technical aspects of this alternative can be found above in the discussion relating to the former lagoon (FL-4).

Operation and maintenance requirements for incineration are technically complex and require highly trained personnel specifically trained in that area.

The various tasks associated with this alternative are indicated on the detailed cost estimate sheets, Table 29.

Land use restrictions would not be required for this alternative.

The capital, operation and maintenance, and present worth costs for this alternative including the rotary kiln and infrared incinerator technologies are provided in Tables 29 and 30. The reliability of the cost per ton for incineration cannot be verified with any actual construction cost because full-scale on-site hazardous waste incineration has not taken place. Therefore, the cost for on-site incineration is not well-defined and could vary significantly for actual construction. The cost for infrared incineration, provided by a vendor, is significantly lower than that for rotary kiln incineration. Due to the lack of full-scale experience with hazardous waste incineration, this potential cost savings cannot be fully substantiated.

There are conditions at Kettle Pond site which would require implementation of specialized construction techniques. Subsurface steel sheet piling would be required to provide stability to the Otis Street roadway during excavation of contaminated material at Kettle Pond and Otis Street (west embankment) areas. Also, the soil/waste material is currently situated in ground water, and dewatering would be required to allow for excavation in the dry. Water from the dewatering operation would require treatment and disposal. These construction techniques are well-demonstrated, and associated cost factors have been considered.

The level of cleanup with incineration is complete because waste contaminants are thermally destroyed.

This alternative would meet the established public health response objectives for the Kettle Pond area. The inhalation, direct contact and accidental ingestion exposure pathways would be eliminated by excavation and thermal destruction of contaminants.

RCRA technical incineration requirements would be complied with.

Also, compliance with Clean Air Act and NPDES technical requirements would be necessary. Compliance with NPDES technical requirements would be satisfied for treated waste water discharges from the on-site incinerator.

The short-term environmental impacts discussed for other Kettle Pond alternatives involving soil/waste excavation also pertain to the soil/waste excavation and on-site incineration construction activities associated with this alternative. RCRA regulations would require trial burns at the site to insure that short-term air quality impacts would not occur.

This alternative would meet the established environmental response objectives for the Kettle Pond area. Removal and destruction of contaminants would also mitigate ground water contamination downgradient of Kettle Pond by eliminating the source of contamination. This alternative would conform to the goal of ground water quality improvement and comply with EPA's ground water protection strategy.

Ground Water Containment Barrier; Site Grading and Capping (KP-5)

This alternative would provide for encapsulation of soil/waste material with impermeable barriers. The impermeable slurry wall would be keyed into the underlying impermeable till. Therefore, the waste material would be contained. Ground water would not flow through the material, leachate would not be generated, and ground water quality downgradient of the barrier would be restored to background levels. Seepage of ground water would still occur through the slurry wall. The surface cap would eliminate infiltration into the containment area and would eliminate direct contact and accidental ingestion pathways. The service life of a slurry wall is not easily predicted; however, it is not expected to be a permanent waste management alternative. A service life of 50 years has been estimated. The structural integrity and impermeable nature of the slurry wall can deteriorate with time due to natural processes and potential chemical reactions with PAH contaminants. Containment barriers, particularly slurry walls, have not had significant application relative to hazardous waste site remediation. Their long-term reliability is questionable and not documented. Most existing facilities have not been in long-term operation. There are no operational requirements for the containment barrier itself. Long-term ground water monitoring would be required. Operational requirements for the surface cap are not complex and include maintenance and mowing. The cap would have to be maintained indefinitely. The various tasks associated with this alternative are indicated on the detailed cost estimate sheets, Table 31.

The area of the site cap and containment barrier would not be available for future development, and deed restrictions would be required.

The capital, operation and maintenance, and present worth costs of this alternative are summarized in Table 31.

There are no identified site conditions that would adversely impact the implementation or construction of this alternative. PAH compatibility with the slurry wall would have to be evaluated in detail during design to ensure that adverse impacts are alleviated.

Site soil/waste material would be contained, except for small quantities of seepage through the barrier wall.

This alternative would meet the established public health response objectives for the Kettle Pond area. The potential direct contact and accidental ingestion exposure pathways would be eliminated. Compliance with RCRA technical requirements concerning landfill closure, post closure and ground water monitoring would be necessary.

Short-term environmental impacts during construction would be minimal for this alternative as summarized below:

- Air emissions would be monitored on-site for worker safety and at potential off-site receptor locations. However, because soil/waste material would not be excavated, air emissions should be minimal.

- Proper sediment and erosion controls will be required to minimize potential adverse impacts to Hocomonco Pond aquatic life, wetland areas, and Hocomonco Pond and discharge stream surface water quality. There is a small wetland immediately downgradient of Kettle Pond within the designated Kettle Pond contamination area. The cap would not extend to this wetland area, and sediment erosion controls would mitigate any potential adverse impacts to the wetland.

A long-term environmental impact of capping the Kettle Pond would be the permanent loss of the wetlands.

This alternative would not meet all the established environmental response objectives for the Kettle Pond area. The containment of contaminated soil/waste material would mitigate ground water degradation downgradient of Kettle Pond by controlling the source. This alternative would conform to the goal of ground water quality improvement and comply with EPA's ground water protection strategy. However, long-term degradation of the slurry wall could result in reoccurrence of ground water quality degradation.

Ground Water Pumping and Treatment: Site Grading and Capping (KP-6)

This alternative would recover contaminated groundwater in the Kettle Pond area and prevent migration of the ground water contamination plume downgradient of Kettle Pond. The recovered ground water would be treated and discharged to surface water or to the town sewer. Two treatment alternatives have been evaluated: 1) granular activated carbon (GAC) and 2) connection to the expanded Westborough sewage treatment plant (STP) currently proposed. The Kettle Pond area would be covered with fill to prevent direct contact or accidental ingestion of contaminated materials.

GAC treatment is a demonstrated effective technology for high efficiency treatment of PAHs. Treatment of hazardous waste leachate at public STPs has been evaluated and shows promise for PAHs. The STP treatment efficiency would be expected to be less than GAC treatment. Bench-scale or pilot plant studies would be required to confirm treatment based on the process design of the Westborough STP.

GAC could be considered a reliable treatment alternative; however, operation and maintenance requirements would be extensive and complex. Personnel would have to be assigned to inspect the facility on a daily basis, maintenance requirements would be substantial for the treatment and pumping system, and the carbon would have to be replaced as required. The major components of the GAC treatment facility would have a service life of approximately 50 years; pumps and other treatment components would have to be replaced on a much more frequent basis. For STP treatment, operation and maintenance requirements would be those related to the ground water extraction system. It is assumed that the Westborough STP will be operated, maintained, and upgraded as required on a permanent basis. For both treatment alternatives, the ground water extraction wells would have to be redeveloped as required. The various tasks associated with this alternative are indicated on the detailed cost estimate sheets, Tables 32 and 33.

The Kettle Pond area would not be available for future development and deed restrictions would be required.

The capital, operation and maintenance, and present worth costs of this alternative are summarized in Tables 32 and 33.

There are no identified site conditions or waste characteristics that would adversely impact the implementation of the GAC treatment alternative. The implementation of the STP treatement alternative is predicated on confirmation of treatability and acceptance by local and state governmental/regulatory agencies.

This alternative would not contain or directly treat the soil/waste material. Leachate will continue to be produced, and the facility would have to be operated on a permanent basis. As previously noted, reduction of PAH levels in soil/waste material by natural processes would take many years. The ground water plume from the Kettle Pond area would be collected and treated. This alternative would meet the established public health response objectives. The potential direct contact and accidental ingestion exposure pathways would be eliminated.

NPDES technical compliance will be required.

Short-term environmental impacts during construction would be minimal for this alternative as summarized below:

- Air emissions would be monitored on-site for worker safety and at potential off-site receptor locations. However, because soil/waste material would not be excavated air emissions should be minimal.

- Proper sediment and erosion controls would be required to minimize potential adverse impacts to Hocomonco Pond aquatic life, wetland areas, and Hocomonco Pond and discharge stream surface water quality. There is a small wetland immediately downgradient of Kettle Pond within the designated Kettle Pond contamination area. Sediment and erosion controls would be required to prevent migration of sediments to this wetland.

A long-term environmental impact of capping the Kettle Pond would be the permanent loss of the wetlands. This alternative would not meet all the established environmental response objectives for this area. Ground water would be treated; therefore, this alternative would conform to the goal of ground water quality improvement and comply with EPA's ground water protection strategy. Reduction of water levels in the wetland area near the extraction system could be expected.

No Action (KP-7)

The no action alternative for the Kettle Pond area consists of 1) fencing the contamination area, 2) ground water quality monitoring, and 3) placing a deed restriction on future use of the area. The no action alternative would not contain, treat, or destroy the hazardous soil/waste material associated with this site. Ground water would continue to degrade downgradient of the site. Fencing the site would minimize associated health risks.

The operation and maintenance requirements of monitoring ground water quality and maintenance of the fence would be minimal.

The area of contamination to be fenced would not be available for future development, and deed restrictions would be required.

The capital, operation and maintenance, and present worth costs of this alternative are provided in Table 34.

The soil/waste material would not be contained, removed, or treated/destroyed. Ground water degradation would persist. Therefore, there would be no cleanup of site contaminants. In-situ physical, chemical, and biodegradation mechanisms are not expected to reduce the material to a non-hazardous classification for many years

Fencing of the Kettle Pond area should reduce the direct contact and accidental ingestion exposure pathways at the site.

Maintaining the site in its current state would not comply with state and federal regulations.

Short-term impacts during fence installation are negligible. The long term environmental impacts include the potential contamination of surface water resulting from ground water discharge to the Hocomonco Pond discharge stream. Potential adverse impacts to public health, aquatic species and wetlands related to contaminated surface water are not addressed by the no action alternative. In addition, the potential future use of the ground water resource would be restricted.

Hocomonco Pond and Discharge Stream

Hydraulic Sediment Dredging and Disposal/Treatment (HP-1)

Removing contaminated sediments from Hocomonco Pond would be an effective and permanent response at this time. The hydraulic dredging technology is a well-demonstrated and proven technology. However, in removing contaminated sediments, the high volume of water extracted to form the pumpable slurry mixture would require treatment. Additional leachability testing of Hocomonco Pond sediments would be required to determine if treatment would be required. A small, remotely operated dredge could be used at this site. Turbidity resulting from the dredging operation should be minimal; floatable-submerged silt fabric could be used to further minimize sediment migration to other area of the pond during a dredging operation. The various tasks associated with this alternative are indicated on the detailed cost estimate sheet Table 35.

Recreational (swimming and fishing) restrictions would not be required after site remediation.

The capital, operation and maintenance, and present worth costs of this alternative are summarized in Tables 35 and 36.

There are no identified site conditions or waste characteristics that would adversely impact the implementation or construction of this alternative.

The level of cleanup at Hocomonco Pond and the discharge stream would be complete.

This alternative would meet the established public health response objectives. The direct contact and accidental ingestion exposure pathways would be eliminated.

RCRA technical requirements would be met for the selected waste disposal activity and NPDES technical compliance would be required for the discharge of treated water from the sediments. State or local floodplain and wetlands laws would also be considered.

Short-term environmental impacts during construction are summarized below:

- Air emmissions and off-site air quality impacts discussed for the former lagoon alternative FL-2 also pertain to this alternative
- Short-term impacts to Hocomonco Pond aquatic species could occur during the dredging operation including uptake by the dredged unit and turbidity impacts during dredging.

  This alternative would meet the established remedial response objectives for Hocomonco Pond. No long-term adverse environmental impacts are projected due to the dredging operation.

Mechanical Sediment Dredging and Disposal/Treatment (HP-2)

Removal of contaminated sediments from Hocomonco Pond by mechanical dredging would be an effective and permanent response. The pond water level would be lowered by pumping, and dragline dredging of relatively dewatered sediments would be conducted from shore. This is a proven, well-demonstrated technology. Turbidity and sediment migration to other areas of the pond during dredging would be controlled. Treatment quantities of leachate water from the sediment dewatering main would be reduced over levels anticipated for hydraulic dredging. The various tasks associated with this alternative are indicated on the detailed cost estimate sheet Table 37.

Recreational (swimming and fishing) restrictions would not be required after site remediation.

The capital, operation and maintenance, and present worth costs of this alternative are summarized in Table 37.

There are no identified site conditions or waste characteristics that would adversely impact the implementation or construction of this alternative.

The level of cleanup at Hocomonco Pond and discharge stream as a result of this alternative is complete.

This alternative would meet the established public health response objectives. The direct contact and accidental exposure pathways would be eliminated. RCRA technical requirements would be met for the selected waste disposal activity and NPDES technical compliance would be required for the discharge of treated water from the sediments. State or local floodplain and wetlands laws would also be considered.

Short-term environmental impacts during construciton are summarized below:

- Air emissions and off-site air quality impacts discussed for the former lagoon alternative FL-2 also pertain to this alternative.
- Some short-term impacts to Hocomonco Pond aquatic species would occur when the pond level is lowered. However, the impact is anticipated to be restricted to the controlled area of dredging.

This alternative would meet the established environmental response objectives for Hocomonco Pond. No long-term adverse impacts are projected due to the dredging operation.

Capping of Sediments (HP-3)

This alternative may be effective in containing the sediments in place. The migration of contaminated sediments would be mitigated. However, organic desorption from sediments to surface water is possible. Further leachability testing of contaminated sediments would be required to fully evaluate this potential. It is expected that the sediment cap would be stable in Hocomonco Pond, due to the low (non-scouring) flow conditions. The stability of the cap at the shoreline is questionable. Erosion of the cap by wave action at the shoreline could be a problem. Frequent inspection of the cap would be required. Capping of contaminated sediments is a well-demonstrated and effective technology; operation and maintenance requirements would be minimal. The various tasks associated with this alternative are indicated on the detailed cost sheet, Table 38.

Recreational (swimming, boating and fishing) restrictions would be required after site remediation. Recreational activities in the area of the cap would threaten the integrity of the cap and possibly result in the release of contaminants.

The capital, operation and maintenance, and present worth costs of this alternative are summarized in Table 38.

There are no identified site conditions or waste characteristics that would adversely impact the implementation or construction of this alternative.

The sediment cap should contain the contaminated sediments and prevent future migration. The sediment material to be capped would not be treated or destroyed; therefore, this alternative does not represent complete cleanup.

If organic desorption from sediments to surface water is determined not to be a problem, this alternative would meet the established public health response objectives. The direct contact and accidental ingestion exposure pathways would be eliminated.

State or local floodplain and wetlands law would also be considered.

Short-term environmental impacts during construction would be minimal as summarized below:

- Air emissions would be monitored on-site for worker safety and at potential off-site receptor locations. However, because sediments would not be excavated, air emissions should be minimal.

- Some short-term impact to Hocomonco Pond aquatic species could occur when the pond level is lowered. However, the impact is anticipated to be restricted to the area to be capped.

Potential long-term environmental and public health concerns exist for contaminant desorption and migration to surface water.

No Action (HP-4)

The no action alternative would consist of continued restrictions on swimming and fishing at Hocomonco Pond. The no-action alternative would not prevent the further migration of contaminated sediments and would not address the potential impacts of contamination in Hocomonco Pond. The restriction on swimming and fishing are not reliable, and the potential for direct contact and accidental ingestion of sediments would continue to exist.

There are no capital, operation and maintenance, and present worth costs associated with this alternative.

The contaminated sediment would not be contained, removed or treated/destroyed. Therefore, there would be no cleanup of site contaminants, and contaminated sediment migration would continue to occur. In-situ waste reduction mechanisms would not reduce the material to a non-hazardous classification for many years. The direct contact and accidental ingestion response objectives would not be met. The potential consumption exposure pathway to humans from fish ingestion would not be addressed.

Maintaining the site in its current state would not comply with state and federal regulations.

The potential long-term impacts discussed for the former lagoon no action alternative also pertain to this no action alternative.

Otis Street Area (East Side)

Embankment Capping (OS-1)

This alternative would be effective in preventing surface water infiltration. The useful life of a properly maintained clay/synthetic liner cap is estimated to be greater than 50 years, at whicn time replacement may be required. Installation of tensiometers below the cap would be recommended to detect leakage to the underlying soils by measurement of soil tension, thereby detecting cap leakage. The surface cap system is a reliable and well-demonstrated technology which prevents surface water infiltration.

The various tasks associated with this alternative are indicated on the detailed cost estimate sheet Table 39.

Operation and maintenance requirements are not complex. They include long-term ground water monitoring, cap maintenance, and mowing to maintain grass cover and prevent tree growth. The facility would have to be maintained indefinitely. Deed restrictions would be required for the embankment area.

The capital, operation and maintenance, and present worth costs for this alternative are summarized in Table 39.

There are no identified site conditions or waste characteristics that would adversely impact the implementation or construction of this alternative.

This alternative would not adequately address the potential public health risks and environmental impacts associated with migration of contamination to surface water in the Hocomonco Pond discharge stream. Compliance with RCRA technical requirements would be required.

Short-term environmental impacts during construction would be minimal for this alternative as summarized below:

- Air emissions would be monitored on-site for worker safety and at potential off-site receptor locations. Air emissions should be minimal since sediments will not be excavated.
- Proper sediment and erosion controls would be required to minimize potential adverse impacts to surface water quality and aquatic life in wetland areas, i.e. Hocomonco Pond and discharge stream. Erosion can be easily controlled at this site.

The long-term environmental response objectives would not be met by this alternative. This alternative, by monitoring ground water and capping the area, would not ensure that surface water quality degradation resulting from contaminant migration through the storm drain would not occur.

Storm Drain Sealing (OS-2)

This alternative would be effective in preventing the potential for infiltration into the storm drain and resulting migration of contaminant to the Hocomonco Pond discharge stream. This is an effective well-demonstrated alternative. Operation or maintenance requirements include the periodic testing of the surface water quality in the discharge stream. The various tasks associated with this alternative are indicated on the detailed cost estimate sheet, Table 40.

Deed restrictions would be required for the embankment area. The capital, operation and maintenance, and present worth costs for this alternative are summarized in Table 40.

There are no site conditions that would prevent the implementation of this alternative.

This alternative would address the potential public health risks and environmental impacts associated with migration of contamination to surface water in the Hocomonco Pond discharge stream.

Short-term environmental impacts during construction would be minimal for this alternative as summarized below:

- Air emissions would be monitored for worker safety and at potential off-site receptor locations. Air emissions should be minimal.
- Proper sediment and erosion controls would be required to minimize potential adverse impacts to surface water quality and aquatic life in wetland areas i.e. Hocomonco Pond and discharge stream. Erosion can be easily controlled at this site.

The long-term environmental response objectives would be met.

No Action (OS-3)

Contaminated soil was not detected within the designated Otis Street contamination area. Low levels of three critical contaminants were detected in the ground water. Creosote odor was present in several storm drain catch basins. The no action alternative would provide for monitoring of ground water and surface water quality (discharge) to detect future contamination.

Deed restrictions would be required for the east embankment area.

The operation and maintenance and present worth costs for this alternative are summarized in Table 41.

The no action alternative would not address the potential public health risks or environmental impacts associated with this area.

Ground water monitoring consistent with the technical requirements of RCRA regulations would be necessary.

RECOMMENDED ALTERNATIVES

Under 40 C.F.R. § 300.68(j) the remedial alternatives selected by the EPA should be determined to be the cost-effective alternative, i.e. the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provide adequate protection of public health, welfare and the environment.

This section summarizes the recommended remedial action selected to address site contamination in the following areas, 1.) Former Lagoon, 2.) Kettle Pond Area, 3.) Hocomonco Pond and Discharge Stream, 4.) Otis Street, and 5.) Isolated Areas.

Former Lagoon

The remedial action, FL-1, recommended for the area of the former lagoon consists of site grading, capping, removal/disposal and relocation of the storm drain pipe which presently runs from Smith Parkway, passing along the east side of the former lagoon, to an outlet at Hocomonco Pond. This alternative is a technologically feasible and reliable means of preventing waste migration by eliminating surface water infiltration and the migration of contaminants via the storm drain. Alternative FL-1 is the lowest cost alternative that effectively mitigates damage to the environment and provides adequate protection of the public health, welfare and environment.

This alternative is particularly applicable for this site contamination area because all soil/waste material is located above the ground water table; therefore, leachate is not produced due to ground water flow-through. The surface cap and storm drain removal/relocation would effectively contain the soil/waste material and prevent contaminant migration to Hocomonco Pond and ground water. The soil/waste material to be capped would not be treated or destroyed. The cap system must be maintained and monitored indefinitely since in-situ physical, chemical or biodegradation mechanisms are not expected to reduce the material to a non-hazardous classification for many years.

This alternative will meet the established long-term environmental response objectives of preventing contaminant migration to Hocomonco Pond and discharge stream as well as protect the ground water in this area from future contamination.

This alternative would meet the established public health response objectives for the former lagoon area. The potential direct contact and accidental ingestion exposure pathways will be eliminated by the capping of soil/waste material and relocation of the storm drain. Compliance with the tecnhical requirements of 40 C.F.R. subpart G and § 264.31 relating to landfill closure and post closure care and 40 C.F.R subpart F relating to ground water protection will assure adequate protection of public health and the environment. The area of the site cap would not be available for future development, and deed restrictions would be required.

A detailed cost estimate for this remedial action is shown on Table 20.

The other remedial alternatives proposed for the former lagoon in the feasibility study but not recommended are discussed below.

Soil/Waste Excavation: Off-Site Landfill Disposal (FL-2)

The reason this alternative (FL-2) is not recommended is that the cost of excavation and off-site disposal is not justified given the site conditions. The cost of this alternative is almost an order of magnitude greater than the recommended alternative. This alternative does not provide for substantially greater protection of the public health, welfare and environment. Since the soil/waste is not contaminating ground water, excavation is not necessary. Furthermore, the potential for short-term adverse impacts related to air quality and wetland/floodplain concerns would be greater if the soil/waste were excavated.

Soil/Waste Excavation: On-Site Landfill Facility (FL-3)

The reason this alternative (FL-3) is not recommended is that the additional cost above that of the recommended alternative (FL-1) are not justified. This alternative does not provide for substantially greater protection of the public health, welfare and environment. The ground water and short-term potential adverse impacts concerns discussed relative to FL-2 also pertain to this alternative (FL-3).

Soil/Waste Excavation: On-Site Incineration (FL-4)

The reasons this alternative (FL-4) is not recommended are the same as those discussed for FL-2 except that the cost of this alternative using rotary kiln incineration is clearly more than an order of magnitude greater than the cost of the recommended alternative (FL-1). This alternative does not provide for substantially greater protection of the public health, welfare and environment. Furthermore, infrared incineration technology is not well demonstrated and, hence, may not be a reliable incineration method for waste materials at this site.

The ground water and short-term potential adverse impacts concerns discussed relative to alternative FL-2 also pertain to this alternative (FL-4).

No Action (FL-5)

The reason this alternative (FL-5) is not recommended is that it does not provide for adequate protection of the public health, welfare and environment.

Kettle Pond Area

The remedial action, KP-3, recommended for the Kettle Pond Area consists of contaminated soil/waste excavation with on-site disposal of the excavated material in a landfill designed to meet RCRA technical standards. Implementation of the alternative will also include dewatering of the Kettle Pond and lowering of the ground water level prior to and during excavation in the immediate Kettle Pond area.

This alternative would effectively mitigate site contamination by removing the source, thereby eliminating the source of ground water contamination in the Kettle Pond area. Ground water draw down prior to soil/waste excavation in the Kettle Pond area is expected to remove contaminated ground water in the area. Evaluation of ground water quality after soil/waste excavation will be part of the recommended alternative.

The extent of soil/waste removal will be based primarily on the visible contamination criteria but will include additional removal of contaminants based on sampling and analysis of soil conducted during excavation to ensure that contaminated soils are excavated to the extent necessary to ensure mitigation of ground water contamination. The extent of excavation beyond the visible contamination criteria is expected to be approximately two to three feet. The costs associated with excavation to this extent are included in the detailed cost estimate.

The ground water pumping and treatment system installed to lower the ground water prior to and during the excavation of soil/waste material will be operated after the excavation, if necessary, contingent upon an evaluation of ground water quality after soil/waste removal. The cleanup level for ground water and the duration of the pump and treatment phase, if necessary, will be determined for the site conditions existing after soil/waste removal.

The performance of the on-site landfill as it relates to the protection of public health and the environment will be assured by compliance with RCRA technical standards.

A double liner, leachate collection and storage, and leak detection system will prevent the migration of contaminants from the landfill, and leakage would be detected and collected prior to entering the ground water. The useful life of a properly maintained on-site landfill is expected to be greater than 50 years. The exact service life cannot be accurately predicted; however, the in-effect "triple" liner system should provide for long-term waste containment. Site conditions are such that a minimum of 10 feet would exist between the base of the landfill and the ground water table. Long-term ground water monitoring and post closure maintenance will also be provided.

Operation and maintenance requirements for an on-site landfill will be relatively complex. They would include ground water monitoring, facility inspection and maintenance and disposal/treatment of leachate that may be generated from within the landfill.

A waste compatability evaluation would be required during design of the liner system.

This alternative would meet the established environmental response objectives for the Kettle Pond area. This alternative will conform to the goal of ground water quality improvement and comply with EPA's ground water protection strategy.

This alternative would meet the established public health response objectives for the Kettle Pond area. The inhalation, direct contact and accidental ingestion exposure pathways will be eliminated by excavation of the soil/waste material from the Kettle Pond site. To achieve CERCLA's goals of protecting public health, welfare, and the environment, there is no practicable alternative but to affect the wetlands in the Kettle Pond area. The selected remedial alternative will include mitigative measures.

The other remedial alternatives proposed for the Kettle Pond area in the feasibility study but not recommended are discussed below.

Site Grading and Capping (KP-1)

The reason this alternative is not recommended is that site grading and capping does not address the concern of ground water contamination, hence, the alternative provides inadequate protection of the environment. Furthermore, capping of the Kettle Pond will result in permanent loss of wetlands.

Soil/Waste Excavation: Off-Site Landfill Disposal (KP-2)

The reason this alternative is not recommended is that the cost of soil/waste excavation: off-site landfill disposal is much higher than the cost of the recommended alternative and does not provide substantially greater protection of the public health, welfare and environment.

Soil/Waste Excavation: On-Site Incineration Facility (KP-4)

The reason this alternative (KP-4) is not recommended is that the cost of the alternative using rotary kiln incineration is too high, almost an order of magnitude greater than the cost of the recommended alternative (KP-3). Furthermore, infrared incineration technology is not well demonstrated, hence, may not be a reliable incineration method for the waste materials at this site.

Additionally, this alternative (KP-4) does not provide substantially greater protection of the public health, welfare and environment, while substantially greater in costs.

Ground Water Containment: Site Grading and Capping (KP-5)

The reason this alternative (KP-5) is not recommended is that the reliability of the slurry wall which is the major element of the containment technology is questionable. Furthermore, since some seepage of ground water is anticipated, continued degradation of ground water quality and migration of contaminated ground water is possible. Furthermore, in order to eliminate the public health concerns related to the ingestion and direct contact exposure pathways the Kettle Pond would be capped. Capping will result in the permanent loss of wetlands.

This alternative (KP-5) is considered unreliable and hence, provides inadequate protection of the public health, welfare and environment.

Ground Water Pumping and Treatment: Site Grading and Capping (KP-6)

The reason this alternative (KP-6) is not recommended is that implementation of the alternative will result in permanent adverse environmental impacts. In order to eliminate the public health concerns related to the ingestion and direct contact exposure pathways, the Kettle Pond would be capped. Capping will result in the permanent loss of wetlands.

No Action (KP-7)

The reason this alternative (KP-7) is not recommended is that it provides inadequate protection of the public health, welfare and environment. The potential ingestion and direct contact exposure pathways are not adequately addressed. The no action alternative does not address the soil/waste source in the ground water nor does it address the concerns related to existing ground water contamination.

Hocomonco Pond and Discharge Stream

The recommended remedial action for Hocomonco Pond and discharge stream is mechanical dredging of contaminated sediments with on-site disposal (HP-2). Disposal based on design consideration related to facility capacity and topography will be either on top of the former lagoon, which will be capped (refer to FL-1), or in an approved landfill facility (refer to KP-3) or a combination of both.

This alternative effectively provides adequate protection of the public health, welfare and environment by removing contaminated sediments from Hocomonco Pond and the discharge stream.

The pond water level in the controlled (bulkheaded) work area of contamination would be lowered by pumping. Mechanical dredging of relatively dewatered sediments would be conducted from shore. Sediments would be excavated to a depth of approximately one foot. This is a proven, well-demonstrated technology. Turbidity and sediment migration to other areas of the pond during dredging will be controlled by a physical barrier (bulkhead). Treatment of leachate water from the dewatering main will be handled by an on-site water treatment unit. Treated water would be discharged to surface water.

No long-term adverse impacts are envisioned due to the dredging operation.

This alternative would meet the established environmental response objectives of restoring Hocomonco Pond to a condition in which recreational (bathing and fishing) restrictions will no longer be required.

This alternative would meet the established public health response objectives. The inhalation, direct contact and accidental exposure pathways would be eliminated. Minimization of adverse air quality impacts resulting from sediment excavation will be addressed during design.

The capital, operation and maintenance, and present worth costs for this alternative are summarized in Table 37.

In terms of the wetlands (Hocomonco Pond and the discharge stream) the short-term and long-term adverse impacts of the recommended alternative have been considered. Although the recommended alternative of dredging will have a short-term adverse impact on the pond and discharge stream, it does provide for a complete cleanup.

To achieve CERCLA's goals of protecting public health, welfare, and the environment, there is no practicable alternative but to affect the pond wetland area. The selected remedial alternative will include mitigative measures.

Consistent with Executive Orders 11988 and 11990 concerning wetlands and floodplains, a Statement of Findings has been prepared and is included as Appendix D to this document.

The other remedial alternatives proposed in the feasibility study for Hocomonco Pond and the discharge stream but not recommended are discussed below.

Hydraulic Sediment Dredging and Disposal/Treatment (HP-1)

The reason this alternative (HP-1) is not recommended is that the cost is substantially higher than the cost of the recommended alternative of mechanical dredging and disposal/treatment. Hydraulic dredging would not provide any additional level of protection for the public health, welfare and environment over that provided by the recommended alternative (HP-2).

Capping of Sediments (HP-3)

The reason this alternative (HP-3) is not recommended is that the reliability of a cap given site conditions is questionable. There is a potential for desorption of contaminants from sediments resulting in a release of contamination to surface water. Capping may provide inadequate protection of the public health and environment. There is a potential exposure pathway, and potential adverse effects on the wetland and wetland aquatic species. Furthermore, capping would have a greater adverse short-term impact on the wetland (Hocomonco Pond) than the recommended alternative.

No Action (HP-4)

The reason this alternative is not recommended is that it provides inadequate protection of the public health, welfare and environment. The public health and environmental response objectives established for the Hocomonco Pond and discharge stream would not be met. Exposure pathways and associate risks to the public health and environment would not be eliminated.

Otis Street (East Side)

The recommended remedial action for the Otis Street (East Side) site area is to seal the open-joint storm drain pipe (OS-2). This alternative would be effective in preventing the potential of contamination from entering the open-joint storm drain and migrating to the Hocomonco Pond discharge stream. This is an effective, well-demonstrated and reliable means to achieve the environmental remedial response objective of protecting surface water quality in the Hocomonco Pond discharge stream and the adjacent wetlands/floodplain area. This alternative (OS-2) will also be an effective, reliable means to achieve the public health objectives by preventing any potential exposure to contaminated surface water in the Hocomonco Pond discharge stream. This alternative (OS-2) will provide adequate protection of the public health, welfare and environment.

Environmental impacts related to wetlands and floodplains during construction will be minimal for this alternative.

To achieve CERCLA's goals of protecting public health, welfare and the environment, there is no practicable alternative but to affect the wetland in the Kettle Pond area. The selected remedial alternative will include mitigative measures.

Consistent with Executive Orders 11988 and 11990 concerning wetlands/floodplains, a Statement of Findings has been prepared for this alternative (refer to Appendix E).

There are no long-term adverse environmental public health impacts identified with this alternative.

There would be no operation or maintenance requirement except for the periodic testing of the surface water quality at the drain outlet (Hocomonco Pond discharge stream). Deed restrictions would be required for the embankment area.

The capital, operation and mainentance, and present worth costs for this alternative are summarized in Table 40.

The other remedial alternatives proposed for Otis Street in the Feasibility Study but not recommended are discussed below.

Embankment Capping (OS-1)

The reason this alternative (OS-1) is not recommended is that the cost is greater than the cost of the recommended alternative and the alternative does not provide adequate protection of the public health, welfare and environment. Also, capping would pose a greater potential for adverse impacts on the Hocomonco Pond discharge stream (Assabet River wetland) than the recommended alternative (OS-2).

No Action (OS-3)

The reason this alternative (OS-3) is not recommended is that it provides inadequate protection of the public health, welfare and environment. The migration of contaminants and the potential exposure pathways to the public and the environment (i.e. Hocomonco Pond discharge stream and Assabet River wetlands), would not be addressed.

Isolated Areas

The remedial actions recommended for the three isolated areas of contamination on-site are discussed below. These three areas pose a potential route of exposure through ingestion and dermal contact with contaminated soils and waste material.

Ten to twelve shallow soil borings and sampling and analysis are needed during the design phase to determine the exact quantity to be excavated from these areas.

Tank Bases - It is recommended that the tank bases be removed for disposal on top of the former lagoon before it is capped or in the landfill to be constructed on site for the Kettle Pond soil/waste material.

This action would be effective in eliminating the risk of exposure, ingestion and dermal contact associated with the creosote product in the tank bases.

Contaminated Soil near MW-1 - It is recommended that the contaminated soil be removed for disposal on top of the former lagoon or in the landfill to be constructed on site for the Kettle Pond soil/waste material.

Storm Drain Channel (Southwest Side of Site) - It is recommended that the contamination in the storm drain channel be removed for disposal in the on-site RCRA landfill to be constructed for the Kettle Pond soil/waste material.

The short-term environmental impacts during implementation of these actions would be minimal.

- Air emissions would be monitored on-site for worker safety and at potential off-site receptor locations.

- Proper sediment and erosion controls would be required relative to actions at the tank bases and storm drain to minimize potential adverse impacts to Hocomonco Pond. Erosion can be easily controlled at these site locations.

No long-term adverse impacts are identified with these actions.

Operation and maintenance costs associated with on-site disposal of these materials has already been addressed relative to the disposal facilities for the Former Lagoon and Kettle Pond alternatives.

Removal and on-site disposal of contaminants identified at these three locations is preferred over the no action alternative. No action would allow for the high potential risk of exposure by humans and animals, particularly at the locations of the tank bases and MW-1.

Capital costs related to the disposal of isolated site contamination are included in the cost estimates for alternative FL-1.

Community Relations

Community relations relative to the studies at the Hocomonco Pond site have been good. Community interest by citizens and local officials is not high but is focused on several issues. The community is concerned about the water quality and future expansion of the water supply at the Otis Street well area. The community is also interested in restoring Hocomonco Pond so that recreational use of the pond can be permitted. Hocomonco Pond is currently closed to all recreational use. Although the town of Westborough is a PRP and potentially liable for cost recovery actions, local officials advocate costly remedial alternatives which would remove and/or destroy the contamination at this site so as to preclude any future problems related to the contamination. Community concerns are addressed in greater detail in the attached Responsiveness Summary.

OPERATION AND MAINTENANCE

Operation and maintenance topics, requirements and costs, are included in the text and on tables referenced in the Summary of the Recommended Alternative section.

CONSISTENCY WITH OTHER FEDERAL ENVIRONMENTAL LAWS

Environmental laws which are applicable or relevant to the actions proposed are as follows:

- Resource Conservation and Recovery Act (RCRA), Part 264.
- Executive Orders 11990 (Wetlands) and 11988 (Floodplain), and Guidance outlined under 40 CFR Part 6, Appendix A.

- Clean Water Act
- Clean Air Act
- Safe Drinking Water Act

The proposed alternatives were reviewed for consistency with applicable RCRA technical standards, specifically 40 C.F.R. Part 264. Subpart G entitled Closure and Post Closure and 40 C.F.R. §264.310 Subpart N - Landfill, entitled Closure and Post Closure Care.

Former Lagoon

The cap and closure activities will be designed in accordance with Section 264.310(a) to:

1) Provide long-term minimization of migration of liquids through the closed landfill;
2) Function with minimum maintenance;
3) Promote drainage and minimize erosion or abrasion of the cover;
4) Accomodate settling and subsidence so that the cover's integrity is maintained; and
5) Have a permeability less than or equal to the permeability of any bottom liner or subsurface soils.

The cap installation will be performed as specified in §264.303. The landfill will be surveyed and a notice will be placed in the deed and to the local land authority as specified in §264.119 and §264.120. The applicable closure requirements in §264 Subpart G will be addressed (Decontamination/Disposal of Equipment, Certification by Professional Engineer) Site Security will be provided as specified in §264.117(b)). Post closure care and ground water monitoring will be performed in accordance with 40 C.F.R. Subparts F and G and Subpart N §264.310(b).

Kettle Pond Area

The excavation and on-site landfill design and construction will be performed in accordance with the applicable RCRA technical standards. The RCRA closure regulations require either closure by removal of waste and waste residues which is equivalent to closure as a surface impoundment or closure as a landfill by capping and appropriate post closure care. The proposed excavation for the Kettle Pond area will meet the technical requirements of 40 C.F.R. Section 264.228, setting out the applicable closure standard requiring the removal or decontamination of all waste residues and contaminated subsoils. As discussed herein, the residual soils contamination level after excavation will be protective of human health and the environment.

A ground water monitoring program will be implemented to monitor water quality.

The design and construction of an on-site RCRA landfill adjacent to the Former Lagoon area will be in accordance with the technical design and operating requirements of 40 C.F.R. §264.301 as amended July 15, 1985 (Federal Register Vol. 50, No. 135, p. 28748). The design will include a double liner system with leak detection between the liners and leachate collection above the top liner. The cover design and post closure care will be in accordance with §264.310(a) and (b) and other applicable requirements. The cover system design will be contiguous with the Former Lagoon area, thereby minimizing the complexity of post closure care (See previous section on former lagoon area for post closure care and ground water monitoring of the landfill).

As part of the excavation process at Kettle Pond, the Pond water and ground water from dewatering operations will be treated in an on-site treatment facility and discharged to surface water. The discharge will meet the applicable National Pollutant Discharge Elimination System (NPDES) technical requirements. The design for the excavation action will include establishing acceptable off-site air quality criteria, an air monitoring sampling program and a contingency plan to minimize adverse air quality impacts. The action levels for air contamination at the site boundary may be that proposed by the Centers for Disease Control (CDC), 2 ppm total concentration of volatile organic compounds in air. During the design phase for the alternatives, other recommendations for acceptable air contaminant levels may be considered. The excavation of contamination and restoration of the wetlands in the Kettle Pond area is the only remedial alternative that actively restores the wetlands area, and meets the intent of Executive Order 11990. The order requires that remedial actions should minimize the destruction, loss or degradation of wetlands.

Hocomonco Pond and Discharge Stream

The mechanical dredging of the Hocomonco Pond and discharge stream sediments is consistent with of Executive Order 11990. Dredging will eliminate the source of contamination.

Air quality monitoring will be performed as part of the dredging process. A sampling plan and a contingency plan will be developed during the design phase. The action levels for air contamination at the site boundary may include that proposed by the Centers for Disease Control (CDC), 2 ppm total concentration of volatile organic compounds in air. During the design phase for the alternatives, other acceptable air contaminant levels may be considered.

The on-site landfill will be constructed and maintained according to the applicable RCRA technical standards.

SCHEDULE

Following is an outline of key milestones and dates for implementation of final remedial actions:

- Approve remedial action (sign ROD) - September 30, 1985
- Complete Enforcement Negotiations - November 29, 1985
- Award Superfund State Contract (SSC) for Design - December 9, 1985
- Send Interagency Agreement (IAG) to Army Corps of Engineers for Design - December 5, 1985
- Start pre-design field studies - March 1, 1986
- Start design - February 1, 1986
- Complete design - September 1, 1986
- Amend SSC and IAG for construction - September 1, 1986
- Start construction - September 6, 1986
- Complete construction - June, 1987

This schedule is dependent on the availability and obligation of funds to implement the project design and construction. The time lag before obligation of final remedial action funds will protract the schedule for implementation by an equal length of time.

FUTURE ACTIONS

Additional field testing as discussed previously in the summary of recommended actions is necessary during design of the selected remedial alternatives. Soil borings and analysis are needed to determine exact volume of soil/waste to be excavated from Kettle Pond, of sediments to be dredged from Hocomonco Pond, and of waste in the three isolated areas (i.e., tank bases, southwest storm drain channel sediments and the area of MW-1). The exact quantities need to be determined in order to design the RCRA landfill for Kettle Pond soil/waste and RCRA cap for the former lagoon area.

In addition, water treatibility studies may be necessary at the Kettle Pond to design a granular activated carbon water treatment system to be used during dewatering in this area.

Future actions also include monitoring of the effectiveness of the cap and onsite landfill as well as assuring future effectiveness of these actions through proper operation and maintenance. Monitoring for cap and landfill effectiveness is required under 40 C.F.R. Part 264 Subparts F and G and Subpart N § 264.310(b).

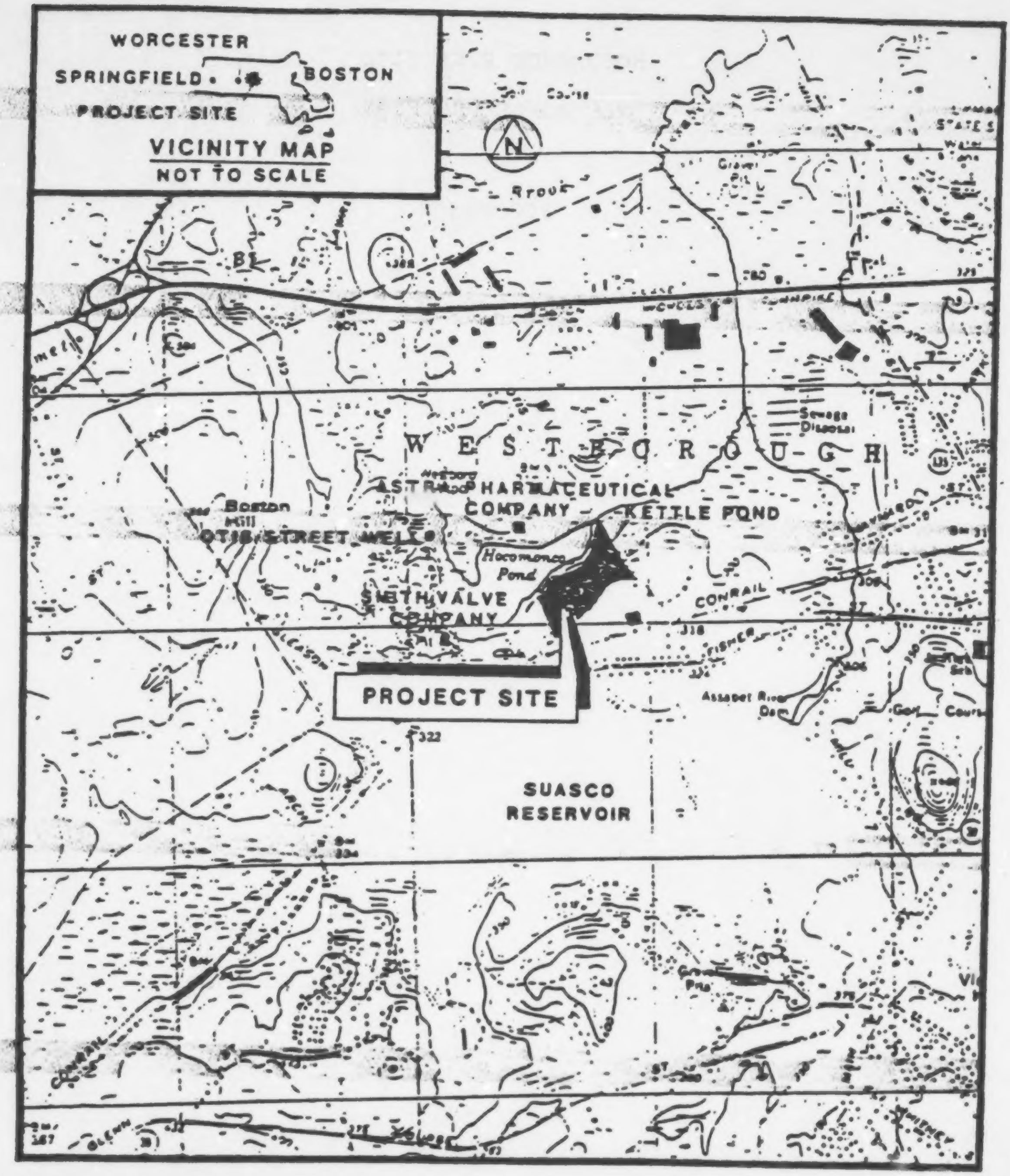
Finally, based upon ground water and soil quality at completion of the Kettle Pond excavation and ground water dewatering and treatment system at the Kettle Pond, the Regional Administrator may determine that ground water pumping and treatment should continue and/or additional soil excavation is needed to achieve final groundwater quality levels, established at that time. Final ground water cleanup levels will be set based upon background levels, Maximum Contaminant Levels (MCL's) or a demonstration of Alternate Concentration Limits (ACLs) according to 40 C.F.R. Part 264.

For security the site will be fenced during design and prior to equipment mobilization and the start of construction. Fencing is necessary to prohibit unauthorized entry and limit public exposure to contamination and construction activities.

HOCOMONCO POND SITE

RECORD OF DECISION

FIGURES


WORCESTER
SPRINGFIELD
BOSTON
PROJECT SITE
VICINITY MAP
NOT TO SCALE
N
WESTBOROUGH
ASTRA PHARMACEUTICAL COMPANY
KETTLE POND
Boston Hill
OTIS STREET WELL
Hocomonco Pond
SMITH VALVE COMPANY
PROJECT SITE
CONRAIL
Sewage Disposal
Assabet River Dam
Golf Course
Gravel Pit
SUASCO RESERVOIR
322
318
0 2000 FT

SOURCE: U.S.G.S Quadrangle Map
Shrewsbury, Mass.
(7.5 minute)

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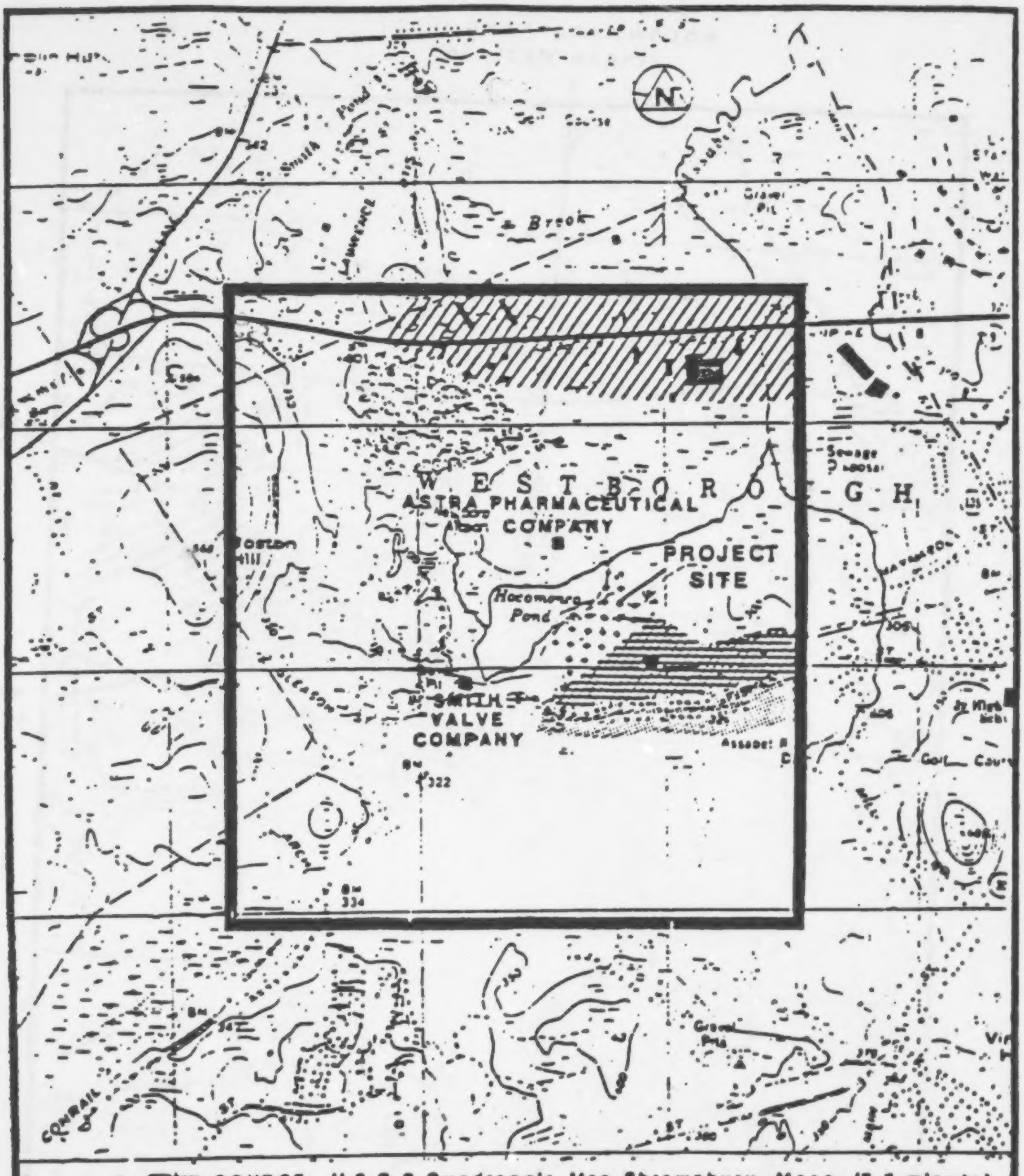
Figure 1 Site Location
Hocomonco Pond Site
Westborough, MA


N
Brook
Gravel Pit
WESTBOROUGH
ASTRA PHARMACEUTICAL COMPANY
PROJECT SITE
Boston Hill
Hocomonco Pond
SMITH VALVE COMPANY
Sewage Disposal
Assabet R
Golf Course
322
334
Conrail
Gravel Pits

SOURCE: U.S.G.S Quadrangle Map Shrewsbury, Mass. (7.5 minute)

LAND USE

☐ VACANT/SPARSELY DEVELOPED

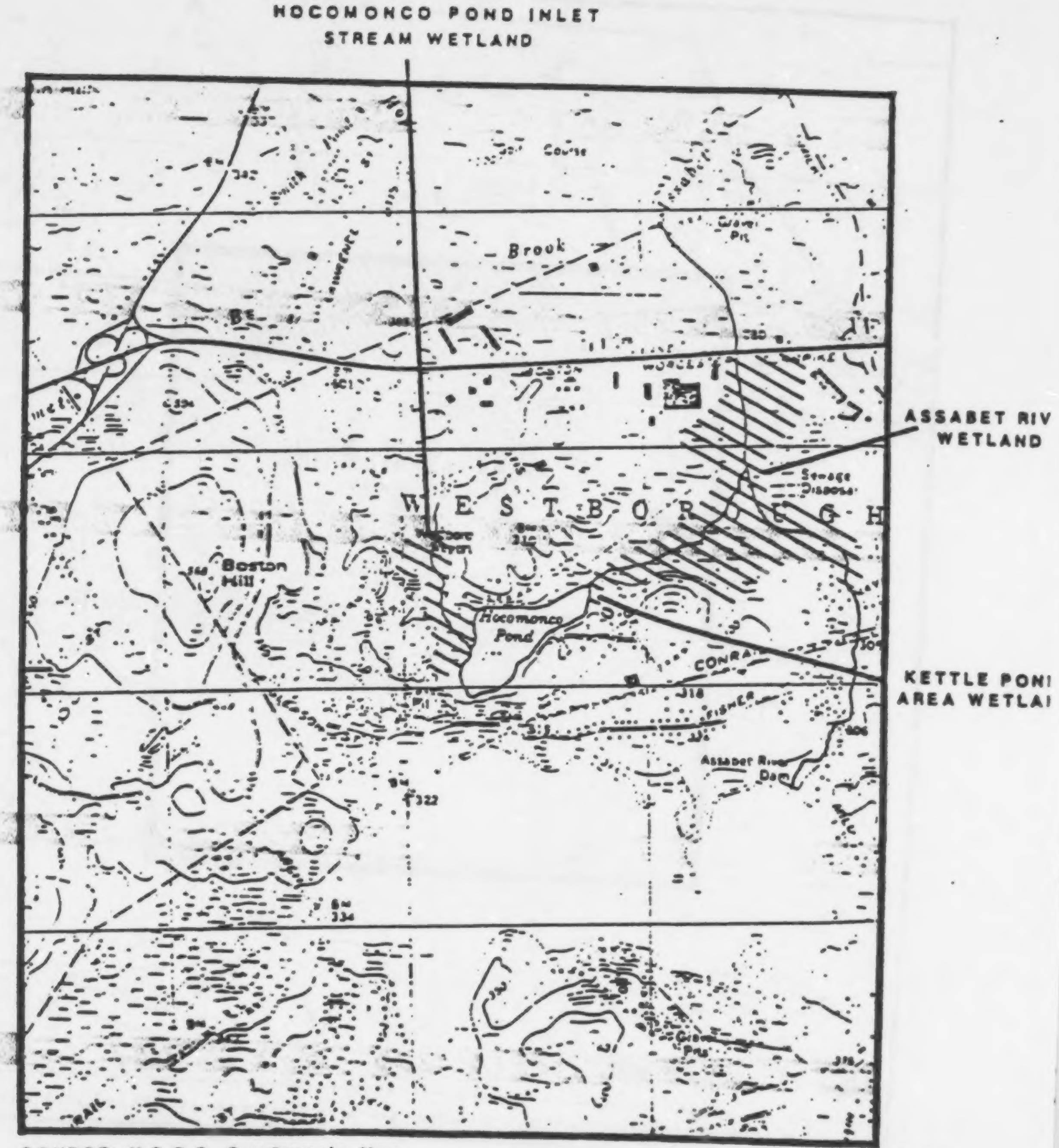
░ AGRICULTURAL

▨ COMMERCIAL

▦ LIGHT INDUSTRIAL

▒ RESIDENTIAL

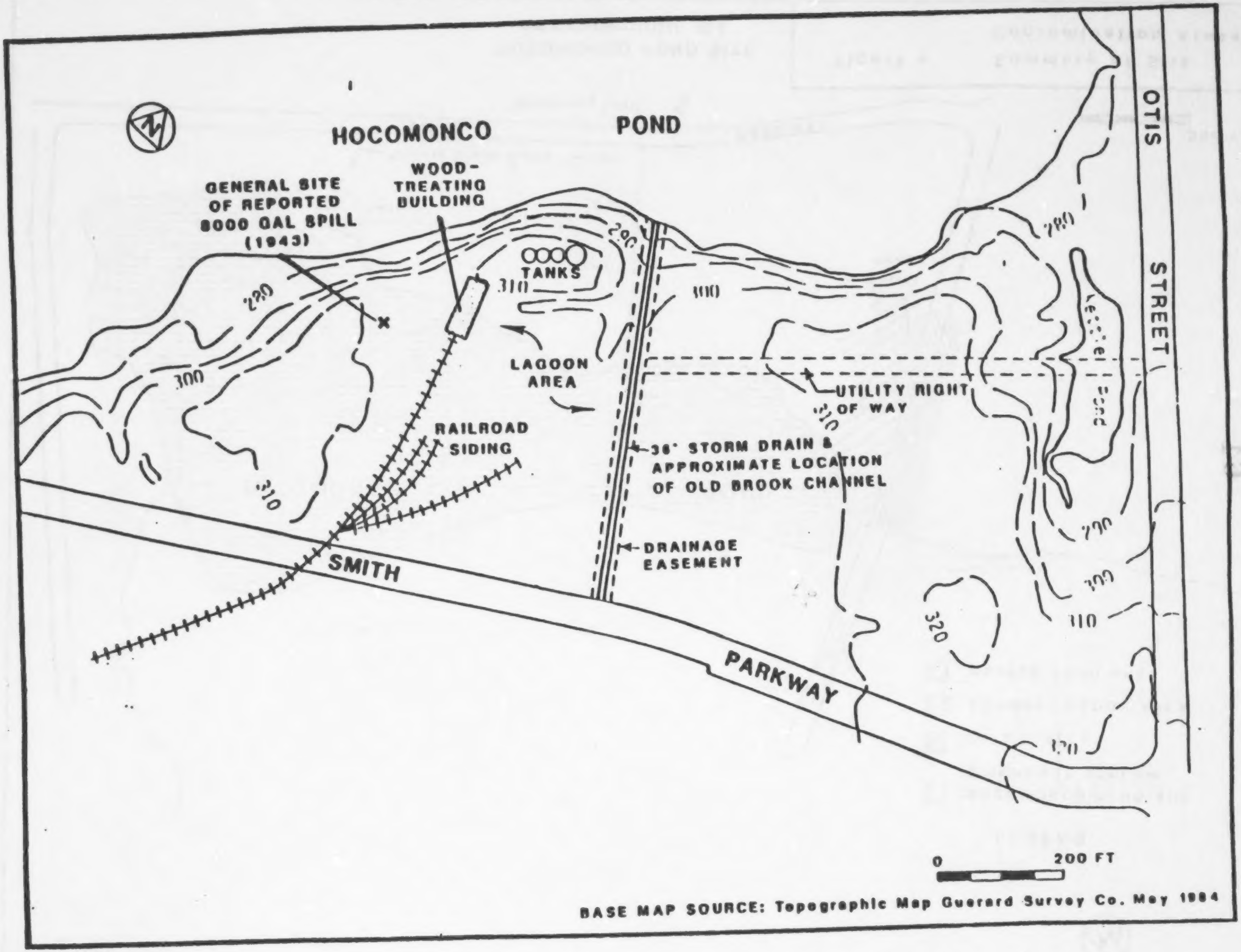
Figure 2 Area Land Use
Hocomonco Pond Site
Westborough, MA


HOCOMONCO POND INLET STREAM WETLAND
ASSABET RIV WETLAND
KETTLE PONI AREA WETLAI
Brook
Course
Gravel Pit
WESTBOROUGH
Boston Hill
Hocomonco Pond
Sewage Disposal
CONRAIL
FISHER
Assabet River Dam
322
334
0
2000 FT

SOURCE: U.S.G.S. Quadrangle Map
Shrewsbury, Mass.
(7.5 minute)

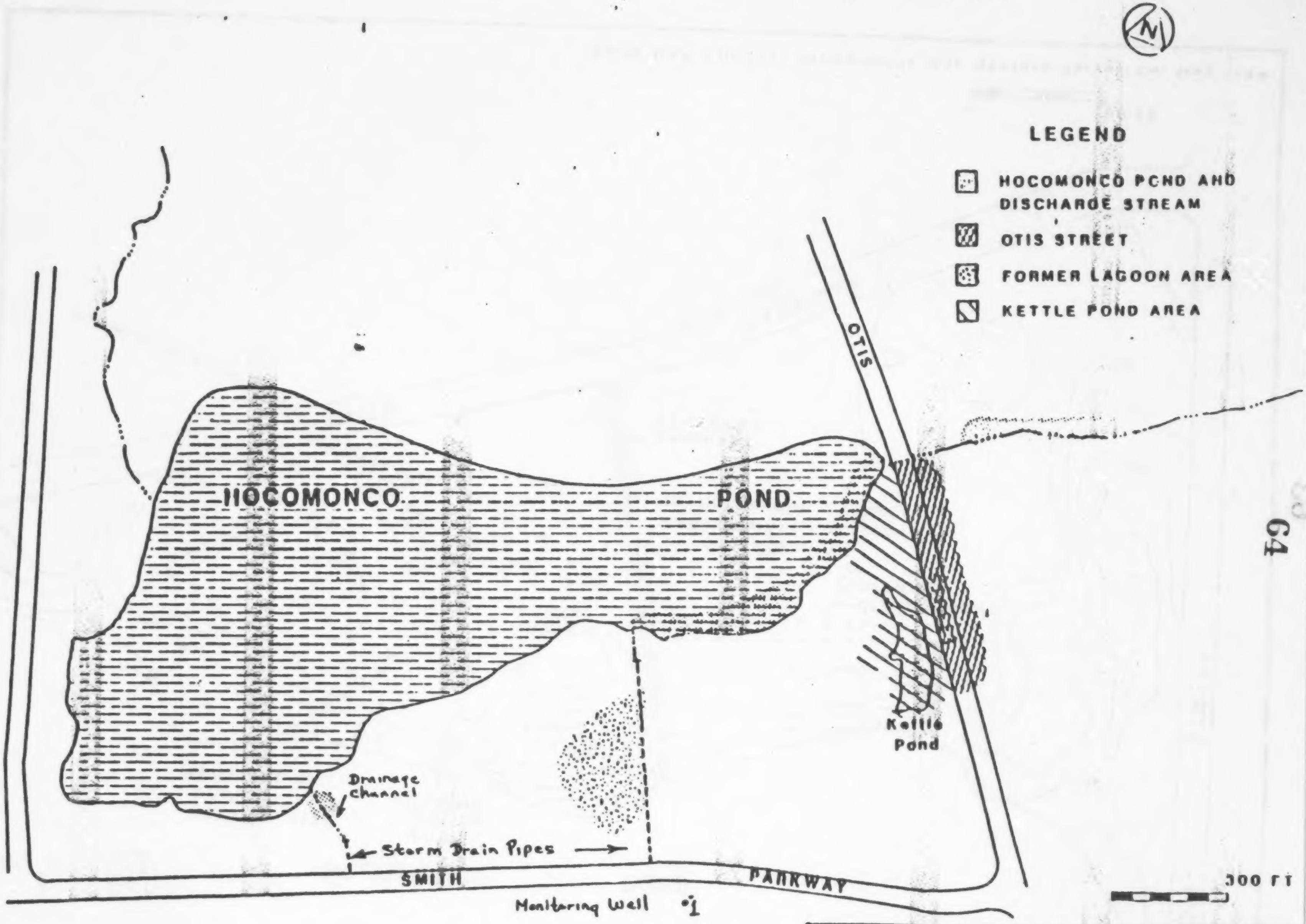
Reproduced from best available copy.

Figure 3. Project Area Wetlands
Hocomonco Pond Site
Westborough, MA


HOCOMONCO POND
WOOD-TREATING BUILDING
GENERAL SITE OF REPORTED 8000 GAL SPILL (1943)
TANKS
LAGOON AREA
RAILROAD SIDING
36" STORM DRAIN & APPROXIMATE LOCATION OF OLD BROOK CHANNEL
DRAINAGE EASEMENT
UTILITY RIGHT OF WAY
Kettle Pond
OTIS STREET
SMITH PARKWAY
280
290
300
310
320
0
200 FT

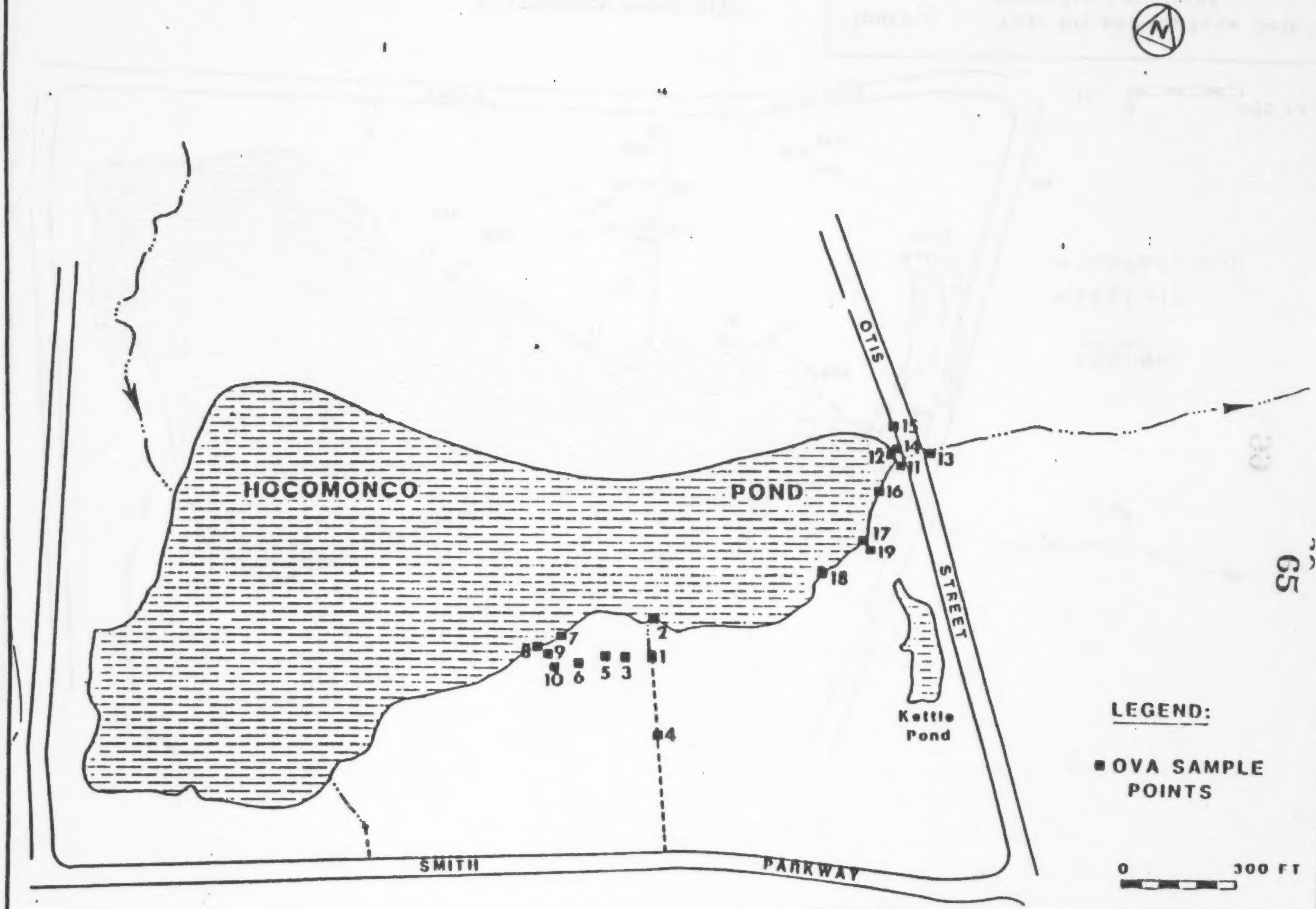
BASE MAP SOURCE: Topographic Map Guerard Survey Co. May 1984

Figure 4 Former Wood Treating Facility Site Layout Map
Hocomonco Pond Site, Westborough, MA


LEGEND
▨ HOCOMONCO POND AND DISCHARGE STREAM
▨ OTIS STREET
▨ FORMER LAGOON AREA
▨ KETTLE POND AREA
OTIS
HOCOMONCO
POND
Kettle Pond
Drainage Channel
Storm Drain Pipes
SMITH
PARKWAY
Monitoring Well 1
300 FT

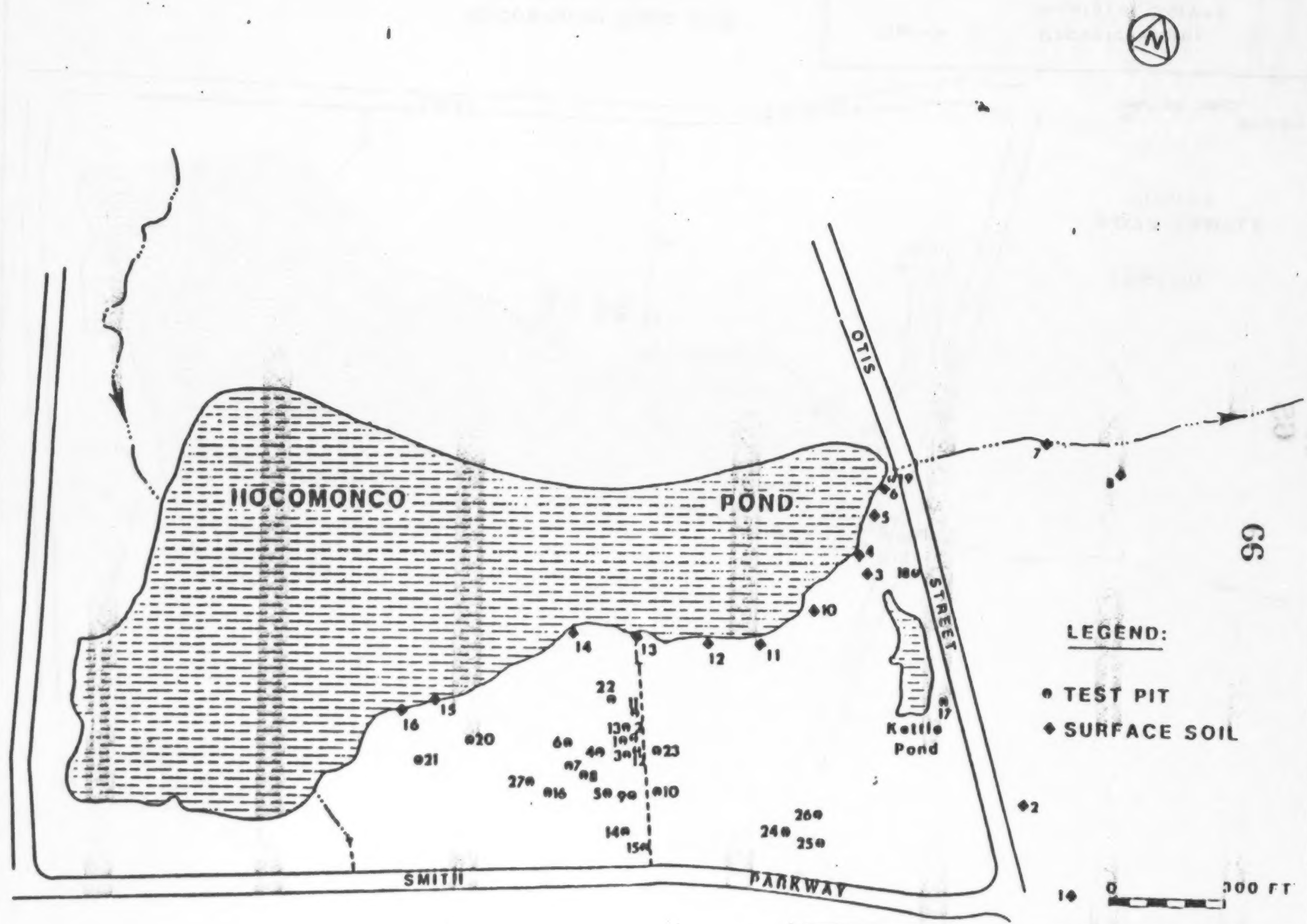
HOCOMONCO POND SITE
WESTBOROUGH, MA

Figure 5 Summary of Site Contamination Areas


N
HOCOMONCO
POND
OTIS
STREET
SMITH
PARKWAY
Kettle Pond
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
LEGEND:
■ OVA SAMPLE POINTS
0
300 FT

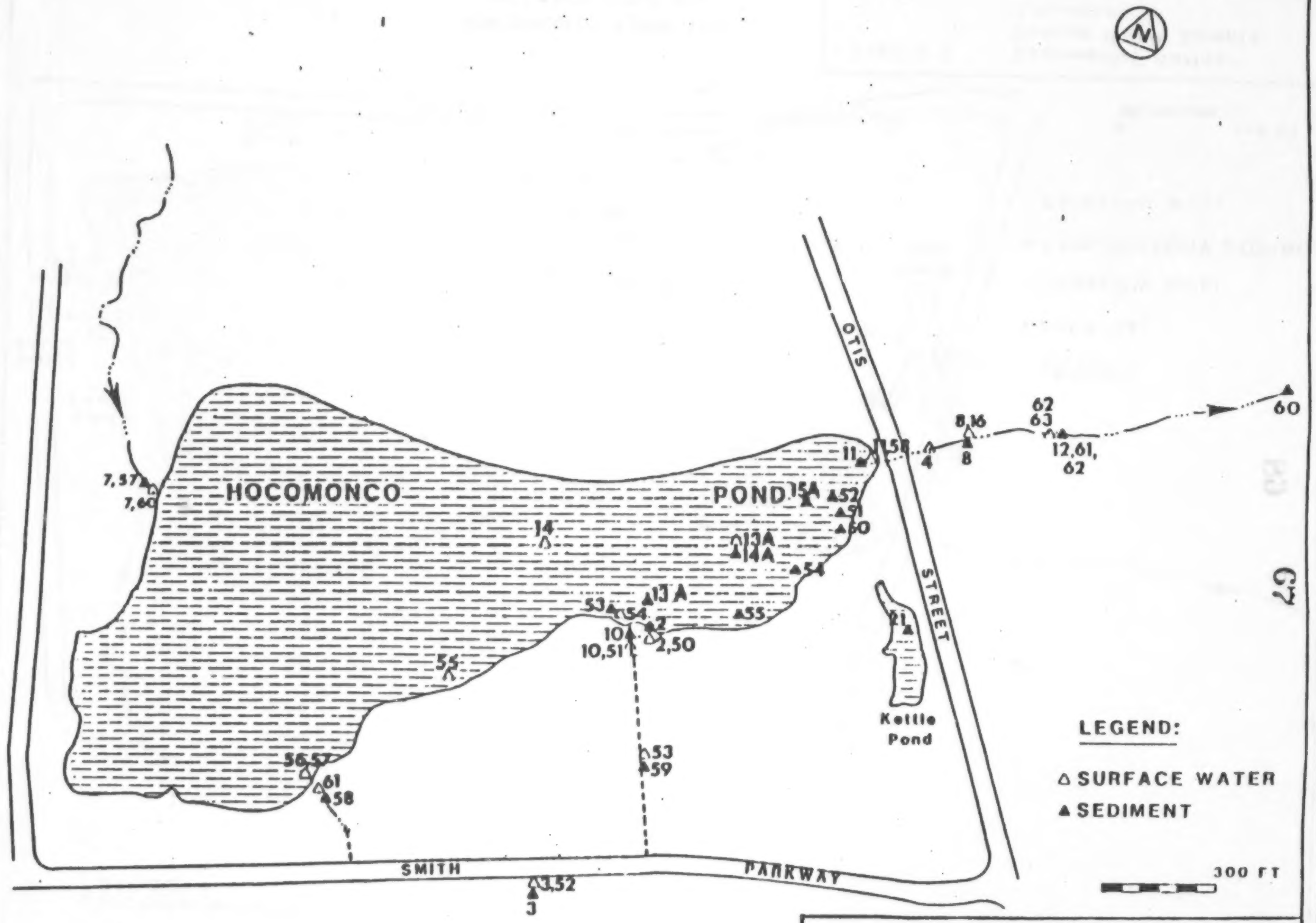
HOCOMONCO POND SITE
WESTBOROUGH, MA

Figure 6 Organic Vapor Analyzer Survey


N
HOCOMONCO
POND
OTIS
STREET
SMITH
PARKWAY
Kettle Pond
LEGEND:
● TEST PIT
◆ SURFACE SOIL
0
00 FT
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
1
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
20
21
22
23
24
25
26
27

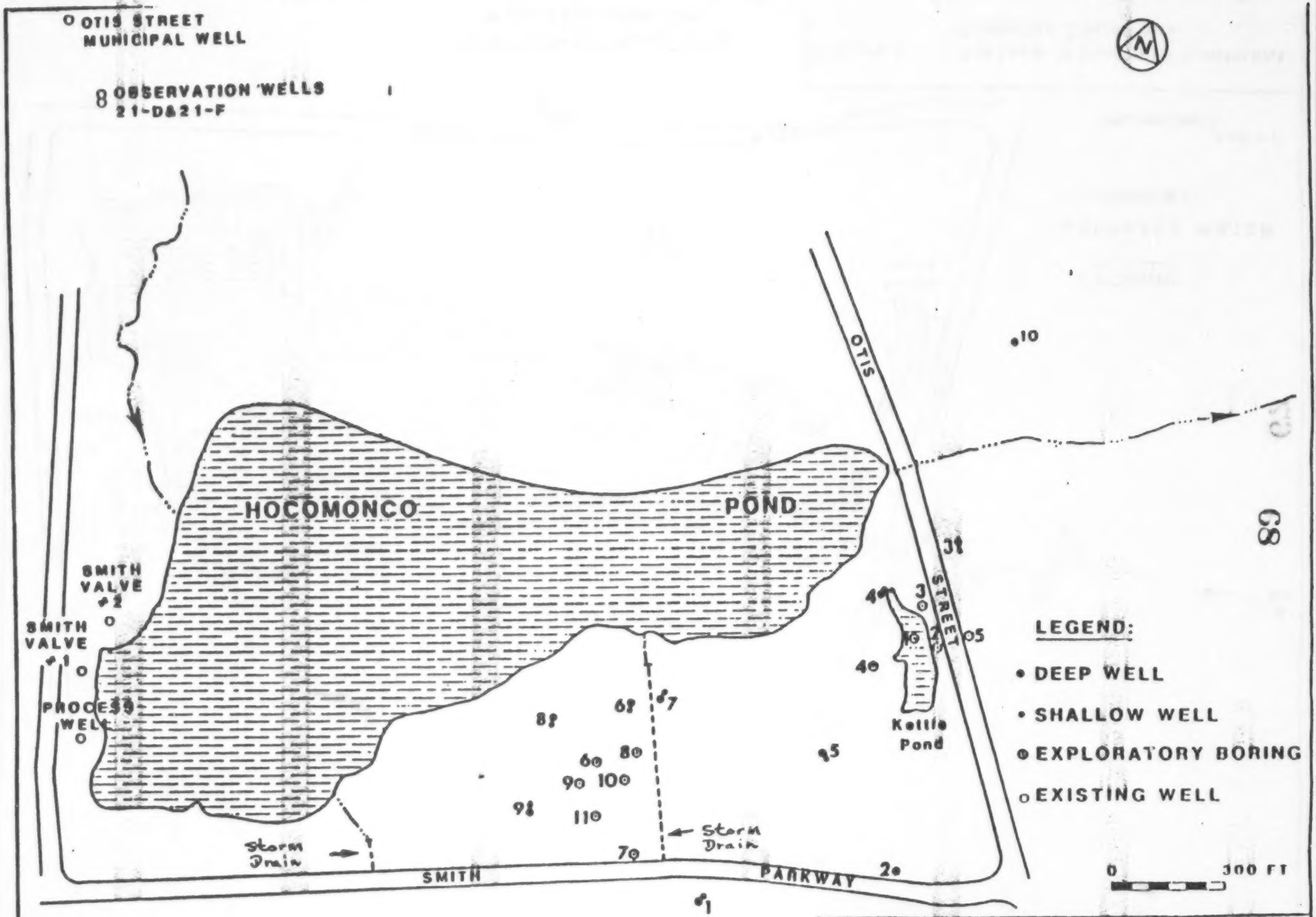
HOCOMONCO POND SITE
WESTBOROUGH, MA

Figure 7 Test Pit and Surface Soil Sampling Locations


N
HOCOMONCO
POND
OTIS
STREET
SMITH
PARKWAY
Kettle Pond
7,57
7,60
14
15A
52
51
50
13A
14A
54
13A
53
54
2
10
10,51
2,50
55
55
56,57
61
58
53
59
3,52
3
21
11
58
4
8,16
8
62
63
12,61,
62
60
LEGEND:
△ SURFACE WATER
▲ SEDIMENT
300 FT

HOCOMONCO POND SITE
WESTBOROUGH, MA

Figure 8 Surface Water and Sediment Sampling Locations


OTIS STREET MUNICIPAL WELL
OBSERVATION WELLS 21-D&21-F
HOCOMONCO
POND
OTIS STREET
SMITH VALVE #2
SMITH VALVE #1
PROCESS WELL
Kettle Pond
Storm Drain
Storm Drain
SMITH PARKWAY
1
2
3
4
5
6
7
8
9
10
11
LEGEND:
• DEEP WELL
• SHALLOW WELL
⊙ EXPLORATORY BORING
○ EXISTING WELL
0
300 FT
N

HOCOMONCO POND SITE
WESTBOROUGH, MA

Figure 9 Exploratory Boring/ Ground Water Sample Locations

HOCOMONCO POND SITE

RECORD OF DECISION

TABLES

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TABLE 1

SUMMARY OF ORGANIC SITE CONTAMINATION
FORMER LAGOON AREA
HOCOMONCO POND SITE, WESTBOROUGH, MA

Parameter	Concentration Range Soil[1] (µg/kg)	Concentration Range Ground Water[2] (µg/l)
2,4-dimethylphenol	ND	ND
phenol	ND-BDL	ND
2-methylphenol	ND	ND
4-methylphenol	ND	ND
acenaphthene	BDL - 308,000	ND
fluoranthene	867 - 1,590,000	ND
naphthalene	BDL - 3,090,000	ND-BDL
benzo(a)pyrene	ND	ND
benzo(a)anthracene	ND - 289,000	ND
benzo(b)fluoranthene	ND - 149,000	ND
benzo(k)fluoranthene	ND - 74,000	ND
chrysene	ND - 286,000	ND
acenaphthylene	ND	ND
anthracene	BDL - 1,770,000	ND
benzo(ghi)perylene	ND - 136,000	ND
fluorene	BDL - 340,000	ND
phenanthrene	811 - 2,040,000	ND
indeno(1,2,3,-cd)pyrene	ND - 178,000	ND
pyrene	561 - 1,002,000	ND
dibenzofuran[3]	BDL - 279,000	ND
2-methylnaphthalene	BDL - 1,560,000	ND
benzene	ND	ND
isophorone	ND	ND
p-chloro-m-cresol	ND	ND
2-chlorophenol	ND	ND

---

[1] Lower range concentration from borings (X-8, X-10) at a depth of 18-20 feet below grade. Higher range values from test pit (TP-12) within an area of visible contamination 3 feet below grade.

[2] Ground water data are compilation of MW-6, 7, 8, and 9.

[3] 2,3,7,8 dibenzo-p-dioxin was not detected.

ND = Not Detected.

BDL = Detected Below Detection Limit.

TABLE 2

SUMMARY OF INORGANIC SITE CONTAMINATION
FORMER LAGOON AREA
HOCOMONCO POND SITE, WESTBOROUGH, MA

Parameter	Concentration Range Soil (mg/kg)	Ground Water (µg/l)
Aluminum	6160 - 14700[1]	ND-2190[1]
Antimony	ND	ND-23[1]
Arsenic	ND-20[1]	ND
Barium	9-55[1]	ND-533[1]
Beryllium	ND-0.5[1]	ND
Cadmium	ND	ND
Chromium	8-26	ND-14
Cobalt	4-19[1]	ND
Copper	5-23[1]	ND
Iron	7440-16,000[1]	ND-667[2]
Lead	3.2-5.2	ND-33[1]
Manganese	57-228	ND-31600[1,2]
Mercury	ND-0.07[1]	ND-1.0[1]
Nickel	5-18[1]	ND-60[1]
Selenium	ND	ND
Silver	ND	ND
Thallium	ND	ND
Tin	ND	ND-39
Vanadium	ND-40[1]	ND
Zinc	13-41[1]	ND-39

[1] Above background levels.

[2] Above recommended limit.

ND = Not Detected.

TABLE 3

SUMMARY OF ORGANIC SITE CONTAMINATION
KETTLE POND AREA
HOCOMONCO POND SITE, WESTBOROUGH, MA

Parameter	Concentration Range Soil (µg/kg)	 Product (µg/kg)	 Ground Water[1] (µg/l)
2,4-dimethylphenol	ND	ND	504-6300
phenol	ND	ND	97-2200
2-methylphenol	ND	ND	308-3300
4-methylphenol	ND	ND	380-7700
acenaphthene	ND-17,780	4,400,000	ND-300
fluoranthene	ND-482,702	2,400,000	ND
naphthalene	6,900-55,200	28,000,000	1058-11,000
benzo(a)pyrene	ND	BDL	
benzo(a)anthracene	ND-96,988	1,500,000	ND
benzo(a)fluoranthene	ND	BDL	ND
benzo(k)fluoranthene	ND	ND	ND
chrysene	ND-99,898	1,700,000	ND
acenaphthylene	ND-10,719	1,600,000	23-200
anthracene	ND-50,801	22,000,000	BDL
benzo(ghi)perylene	ND-41,937	ND	ND-1200
fluorene	ND-27,276	11,000,000	32-300
phenanthrene	ND-129,901	19,000,000	100-300
indeno(1,2,3,-cd)pyrene	ND-106,717	ND	ND
pyrene	ND-286,737	52,000,000	ND
dibenzofuran[2]	ND-16,809	6,900,000	36-300
2-methylnaphthalene	ND-12,500	8,200,000	96-750
benzene	ND	ND	91-94
isophorone	ND	ND	ND
p-chloro-m-cresol	ND	34,000	ND
2-chlorophenol	ND	BDL	ND
toluene	BDL	BDL	ND-200
total xylenes	BDL	34,000	ND-180
benzoic acid	ND-12,000	ND	ND-280
di-n-octyl phthalate	ND-2900	ND	ND

[1] Data from MW-4.

[2] 2,3,7,8 dibenzo-p-dioxin was not detected.

ND = Not Detected.

BDL = Detected Below Detection Limit.

TABLE 4

SUMMARY OF INORGANIC SITE CONTAMINATION
KETTLE POND AREA
HOCOMONCO POND SITE, WESTBOROUGH, MA

Parameter	Soil (mg/kg)	Product[3] (mg/kg)	Ground Water (μg/l)
Aluminum	3500-14900[1]	392	ND-300
Antimony	ND	ND	ND
Arsenic	3-21[1]	111	ND-50[1]
Barium	10-40[1]	5	ND
Beryllium	ND-1.9[1]	<0.2	ND
Cadmium	ND-0.3	0.950	ND
Chromium	6.8-52[1]	1060	ND
Cobalt	3-13[1]	<2	ND
Copper	6-32[1]	515	ND
Iron	5970-32,400[1]	1220	101-11,000[1,2]
Lead	2.5-14	66	ND-8
Manganese	63-156	8.2	140-1830[1,2]
Mercury	ND-0.56[1]	1.06	ND
Nickel	4-33[1]	<2	ND
Selenium	ND-0.2	2.8	ND-3.5[1]
Silver	ND	<0.5	ND
Thallium	ND	2	ND
Tin	ND	3	ND-36
Vanadium	ND-52[1]	<10	ND
Zinc	12-89[1]	78	ND-18

[1] Above background levels.

[2] Above recommended concentration.

[3] Creosote product at surface of Kettle Pond.

ND = Not Detected.

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TABLE 5

SUMMARY OF ORGANIC SITE CONTAMINATION
HOCOMONCO POND AND DISCHARGE STREAM
HOCOMONCO POND SITE, WESTBOROUGH, MA

Parameter	Concentration Range Pond Sediments[1] (µg/kg)	Stream Sediments (µg/kg)	Surface Water (µg/l)
2,4-dimethylphenol	ND	ND	ND
phenol	ND	ND	ND
2-methylphenol	ND	ND	ND-8
4-methylphenol	ND	ND	ND-8
acenaphthene	ND	BDL	BDL-120
fluoranthene	ND-34,188	6,140-49,900	BDL-200
naphthalene	ND-29,412	BDL-140,600	ND-530
benzo(a)pyrene	ND-1,100	ND-BDL	ND
benzo(a)anthracene	ND-4,054	ND-BDL	ND-35
benzo(a)fluoranthene	ND	ND-BDL	ND
benzo(k)fluoranthene	ND	ND	ND
chrysene	ND-3,941	BDL-1,047	ND-26
acenaphthylene	ND-BDL	ND-BDL	ND-40
anthracene	ND-3,012	BDL	ND-46
benzo(ghi)perylene	ND-BDL	ND	ND
fluorene	ND-11,481	BDL-3,550	BDL-160
phenanthrene	BDL-34,104	ND-54,430	BDL-400
indeno(1,2,3,-cd)pyrene	ND-484	ND	ND
pyrene	ND-20,800	BDL-5,066	ND-130
dibenzofuran[2]	ND-8,824	ND-BDL	ND
2-methylnaphthalene	ND-6,824	ND-BDL	ND-170
benzene	ND	ND	ND-27
total xylenes	ND	ND	ND-6
p-chloro-m-cresol	ND	ND-BDL	ND
2-chlorophenol	ND	ND-73,320	ND

---

[1] Higher range values generally at the pond outlet (SD-11).

[2] 2,3,7,8 dibenzo-p-dioxin was not detected.

ND = Not Detected.

BDL = Detected Below Detection Limit.

TABLE 6

SUMMARY OF INORGANIC SITE CONTAMINATION
HOCOMONCO POND AND DISCHARGE STREAM
HOCOMONCO POND SITE, WESTBOROUGH, MA

Parameter	Concentration Range Pond Sediments (mg/kg)	 Stream Sediments (mg/kg)
Aluminum	1200-7000[1]	1500-6030[1]
Antimony	ND-0.5	ND
Arsenic	0.6-9.2	2-5.6
Barium	ND-45[1]	10-30[1]
Beryllium	ND-0.27[1]	ND
Cadmium	ND-0.28[1]	ND-0.15[1]
Chromium	2.2-18[1]	2.8-11[1]
Cobalt	ND-13[1]	ND-7.8[1]
Copper	4.5-24[1]	6-12[1]
Iron	2400-10,000[1]	2200-7630[1]
Lead	1.0-19[1]	6.6-21[1]
Manganese	68-150[1]	68-302[1]
Mercury	ND-0.96[1]	.06-0.42[1]
Nickel	ND-17[1]	ND-5[1]
Selenium	ND-0.4[1]	ND-0.2[1]
Silver	ND-2.3[1]	ND-0.7[1]
Thallium	ND	ND
Tin	ND-2	ND-2
Vanadium	ND-39[1]	ND-30[1]
Zinc	12-37	13-35

[1] Above background levels.
ND = Not Detected.

TABLE 7

SUMMARY OF ORGANIC SITE CONTAMINATION
OTIS STREET (EAST SIDE)
HOCOMONCO POND SITE, WESTBOROUGH, MA

Parameter	Concentration Range[1 & 2]	
	Soil (μg/kg)	Ground Water (μg/l)
2,4-dimethylphenol	ND	15
phenol	ND	ND
2-methylphenol	ND	11
4-methylphenol	ND	18
acenaphthene	BDL	ND
fluoranthene	ND	ND
naphthalene	BDL	ND
benzo(a)pyrene	ND	ND
benzo(a)anthracene	ND	ND
benzo(a)fluoranthene	ND	ND
benzo(k)fluoranthene	ND	ND
chrysene	ND	ND
acenaphthylene	ND	ND
anthracene	ND	ND
benzo(ghi)perylene	ND	ND
fluorene	ND	ND
phenanthrene	ND	ND
indeno(1,2,3,-cd)pyrene	ND	ND
pyrene	ND	ND
dibenzofuran[3]	ND	ND
2-methylnaphthalene	ND	ND
benzene	ND	ND
isophorone	ND	ND
p-chloro-m-cresol	ND	ND
2-chlorophenol	ND	ND
toluene	ND	BDL

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[1] Parameters were detected in third sampling round (Dec. 1984) based on a detection limit of 2 μg/l. Previous analytical results (first and second round) reported ND based on 20-40 μg/l detection limit.

[2] Data from MW-3.

[3] 2,3,7,8 dibenzo-p-dioxin was not detected.

ND = Not Detected.

BDL = Detected Below Detection Limit.

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TABLE 3

SUMMARY OF INORGANIC SITE CONTAMINATION
OTIS STREET (EAST SIDE)
HOCOMONCO POND SITE, WESTBOROUGH, MA

Parameter	Concentration Range Soil (mg/kg)	 Ground Water 3 (µg/l)
Aluminum	3500-8450	ND-3500[1]
Antimony	ND	ND
Arsenic	6-8	ND
Barium	20-30	ND-281[1]
Beryllium	ND	ND
Cadmium	ND	ND-10[1]
Chromium	8.3-12	ND-20[1]
Cobalt	4	ND
Copper	8-11[1]	ND
Iron	5970-10,000	ND-131
Lead	2.5-3.3	ND-28[1]
Manganese	65-101	ND-400[2]
Mercury	ND	ND-0.3[1]
Nickel	4-9	ND-40
Selenium	ND	ND-1.1
Silver	ND	ND
Thallium	ND	ND
Tin	ND	ND-36
Vanadium	ND-20	ND
Zinc	20-26[1]	ND-128

[1] Above background levels.

[2] Above recommended secondary drinking water standards.

ND = Not Detected.

3 Data for MW-3.

TABLE 9

SUMMARY OF ORGANIC VAPOR ANALYZER SAMPLE LOCATIONS
HOCOMONCO POND SITE, WESTBOROUGH, MA

Sample No.	Sample Location & Description	OVA Reading (ppm above ambient)
1	Storm sewer outlet, no odor, black stained rocks.	0.10
2	Oil boom, area clear of snow, thin layer of broken ice. Water and sediment agitated, oil film on top of water.	0.20
3	East side of bluff, just above sewer outlet. Dug into frozen soil 2".	0.10
4	Manhole from storm sewer east of lagoon.	0.15
5	Foundation of east storage tank on top of the bluff. Dug hole in frozen soil 2".	0.15
6	Foundation of west storage tank on top of bluff. Dug hole in frozen soil 4".	0.20
7	Bottom of steep hill below boiler platform. Water was unfrozen and agitated. No odor or film present.	0.25
8	200' east of sample no. 7 below concrete retaining wall. Area clear of snow and turned over with a shovel. No odor present.	0.15
9	15' above concrete retaining wall. Removed snow cover and dug small hole 2".	0.5
10	Two small diameter metal pipes protruding out of north side of bluff at west end. Approx. 100' above the retaining wall.	
	Large pipe	0.15
	Small pipe	0.25
11	Outlet of pond 15' upstream from culvert. Sediment agitated producing large amount of oil sheen and odor.	>10.0
12	30' upstream of sample no. 11 agitated sediment, large oil sheen and odor present. OVA set on 10x.	95

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TABLE 9
(Continued)

SUMMARY OF ORGANIC VAPOR ANALYZER SAMPLE LOCATIONS
HOCOMONCO POND SITE, WESTBOROUGH, MA

Sample No.	Sample Location & Description	OVA Reading (ppm above ambient)
13	Downstream of culvert. New fill and grading. When agitated, produces heavy oil sheen and odor.	No reading
14	Upstream, north side of outlet. Agitated sediment produces strong odor and oil sheen.	>10.0
15	50 yards north of outlet in woods. Wet soil not frozen. No odor present.	0.10
16	Approx. 50 yards south of outlet on south shore. Unfrozen water 5' x 20'. Sediment agitated.	3.8
17	Southeast corner of pond. Agitated sediment, two metal drums in vicinity. Odor and oil sheen present.	>10.0
18	60 yards up shore from sample no. 17. Ice was broken and soil agitated. No odor or oil sheen present.	0.10
19	200' in shore from sample no. 17. Area is a low depression. Soil is moist and unfrozen. Three readings in same area have the same results.	0.10

ppm = parts per million

TABLE 10

ORGANIC COMPOUNDS DETECTED IN MW-1 SOIL SAMPLES
HOCOMONCO POND SITE, WESTBOROUGH, MA

Compound	Concentration* (μg/kg)
fluoranthene	8,971
benzo(a)fluoranthene	3,009
benzo(b)fluoranthene	4,098
phenanthrene	2,448
pyrene	6,048

*Concentrations are approximate based on QA/QC review.

TABLE 11

ORGANIC COMPOUNDS DETECTED IN SURFACE WATER
HOCOMONCO POND SITE, WESTBOROUGH, MA

Compound	Concentration (µg/l)		
	W-51	W-53	W-54
acenaphthene	BDL	120	BDL
fluoranthene	25	200	BDL
naphthalene	ND	530	25
benzo(a)anthracene	ND	35	ND
chrysene	ND	26	ND
acenaphthylene	ND	40	ND
anthracene	BDL	46	ND
fluorene	BDL	160	BDL
phenanthrene	12	400	BDL
pyrene	14	130	ND
dibenzofuran[1]	BDL	120	BDL
2-methylnaphthalene	ND	170	ND
2,4-dimethylphenol	BDL	13	ND
2-methylphenol	ND	8	ND**
4-methylphenol	ND	8	ND**
benzene	ND	ND	27
total xylenes	ND	ND	6

**Data rejected in QA/QC review

BDL - Below detection limit in analysis (see text for further definition)

ND - Not detected in analysis (see text for further definition)

[1] 2,3,7,8 dibenzo-p-dioxin was not detected.

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TABLE 12

ORGANIC COMPOUNDS DETECTED IN SEDIMENT SAMPLES
HOCOMONCO POND SITE, WESTBOROUGH, MA

Compound	Concentration (µg/kg) SD-2	SD-8	SD-10	SD-11	SD-12	SD-21	SD-50	SD-52	SD-53	SD-55	SD-58	SD-59	SD 61	SD 62
acenaphthene	ND	BDL	6,258*	8,400	2,255	4,400,000*	BDL	264	220	BDL	21,812	33,264	BDL	BDL
fluoranthene	222**	6,999**	86,278*	34,118**	20,933**	2,400,000*	ND	1,056	1,232	ND	39,368	46,926	49,900	6,140
isophorone	ND	BDL**	1,765*	BDL**	ND**	ND	ND	ND	ND	ND	ND	ND	ND	ND
naphthalene	ND	BDL	10,781*	29,412	2,688	28,000,000*	525	484	BDL	2,668	32,718	40,590	140,600	BDL
benzo(a)anthracene	BDL	ND	19,635*	4,054	3,772	1,500,000*	ND	616	814	ND	7,980	11,880	BDL	BDL
benzo(a)pyrene	ND	ND	11,858	ND	ND	BDL	ND	836	1,100	ND	BDL	9,504	BDL	ND
benzo(b)fluoranthene	ND	ND	11,408	ND	ND	BDL	ND	ND	ND	ND	ND	12,078	BDL	ND
chrysene	BDL	1,047	18,714*	3,941	4,036	1,700,000*	ND	682	858	ND	5,852	9,504	BDL	BDL
acenaphthylene	ND	BDL	1,334*	BDL	BDL	1,600,000*	ND	BDL	BDL	BDL	8,778	12,474	BDL	ND
anthracene	BDL	BDL	9,149*	3,812	3,776	22,000,000*	ND	748	286	ND	7,448	ND	BDL	BDL
benzo(ghi)perylene	ND	ND	9,842*	BDL	BDL	ND**	ND	BDL	BDL	ND	ND	ND	ND	ND
fluorene	ND	3,113	8,942*	11,482	4,218	11,000,000*	BDL	ND	BDL	BDL	31,920	46,926	BDL	3,550
phenanthrene	BDL	ND	24,638*	34,104	15,040	19,000,000*	BDL	572	374	BDL	81,928	104,350	54,410	13,240
indeno(1,2,3,-cd)pyrene	ND	ND	13,642*	BDL	BDL	ND**	ND	BDL	484	ND	ND	BDL	ND	ND
pyrene	889**	5,066**	79,190*	20,800**	14,120**	52,000,000*	ND	616	858	ND	19,950	30,100	BDL	3,550
dibenzofuran[1]	ND	BDL	6,451*	8,824	2,579	6,900,000*	BDL	264	BDL	253	27,398	39,204	BDL	ND
2-methylnaphthalene	ND	ND	4,592*	6,824	BDL	8,200,000*	BDL	BDL	BDL	BDL	26,600	36,432	BDL	ND
p-chloro-m-cresol	ND*	ND	ND*	ND	ND*	34,000*	ND	1,100	1,540	ND	7,182	ND	ND	BDL
2-chlorophenol	ND*	ND	ND*	ND	ND*	BDL*	ND	ND	ND	ND	ND	ND	ND	13,320

* - Concentration is approximate
** - Data rejected in QA/QC review
ND - Not detected in analysis
BDL - Below detection limit in analysis

[1] 2,3,7,8 dibenzo-p-dioxin was not detected.

TABLE 13

ORGANIC COMPOUNDS DETECTED IN GROUND WATER SAMPLES
HOCOMONCO POND SITE, WESTBOROUGH, MA

Compound	MW-4D*	MW-4S**
2,4-dimethylphenol	504-5200	5200
phenol	97-2200	2000
2-methylphenol	308-3300	2900
4-methylphenol	380-7700	6800
acenaphthene	51-300	200
naphthalene	1058-11,000	11,000
acenaphthylene	23-200	80
fluorene	32-300	200
phenanthrene	ND-200	300
dibenzofuran [1]	36-300	200
2-methylnaphthalene	96-1200	1100
benzene	ND-91	90
toluene	ND-160	200
ethylbenzene	ND-40	60
total xylenes	ND-50	30

* Concentrations (μg/l) for MW-4D are a range of values from the first, second, and third sampling rounds.

** Concentration (μg/l) for MW-4S are from the third sampling round, prior sampling rounds showed no contaminants.

[1] 2,3,7,8 dibenzo-p-dioxin was not detected.

NOTE: Ground water contamination at this site was also detected in MW-3. Refer to Table 7.

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TABLE 14

CRITICAL CONTAMINANTS

Organics:

Carcinogens

- benzo(a)pyrene
- benzene

Non-carcinogens

- napthalene
- fluoranthene

Unknowns

- phenanthrene
- anthracene
- 2-methylnapthalene
- pyrene
- fluorene
- acenapthene
- benzo(a)anthracene
- chrysene
- dibenzofuran
- 2-chlorophenol
- 4-methylphenol
- 2,4-dimethylphenol
- 2-methylphenol
- benzo(ghi)pyrene

Inorganics:

Carcinogens

- chromium
- arsenic

TABLE 15

SUMMARY OF FEASIBILITY STUDY SCREENING OF REMEDIAL ALTERNATIVES

Remedial Alternatives	Evaluation Categories			Capital Cost	
	Technical	Environmental/Public Health	Institutional/Land Use	ID[1]	($)
1. SITE GRADING AND CAPPING	• Feasible containment technology • Reduces infiltration and attributable leachate production • Does not treat or completely contain soil/waste material	• Eliminates direct contact and accidental ingestion exposure pathways • Does not meet Kettle Pond goal of improving ground water quality	• Must comply with RCRA Requirements • Land use restrictions required for surface capping area	FL[1] KP[2]	500,000 600,000
2. SOIL/WASTE EXCAVATION: OFF-SITE LANDFILL DISPOSAL	• Feasible removal technology • Removes waste material from site to RCRA approved off-site landfill • Does not treat or destruct waste, therefore future potential pollution problems exist	• Complies with remedial response objectives established for former lagoon and Kettle Pond areas	• Potential compliance problems exist at RCRA landfills where wastes would be disposed • No land use restrictions required after site remediation	FL[3] KP[3]	6,300,000 8,400,000
3. SOIL/WASTE EXCAVATION: ON-SITE LANDFILL FACILITY	• Feasible containment technology • Reduces threat of leachate migration • Effectively contains soil/waste material • Does not treat waste material	• Complies with remedial response objectives established for former lagoon and Kettle Pond areas	• Must comply with RCRA requirements • Land use restrictions required for on-site landfill area	FL[3] KP[3]	1,200,000 1,500,000
4. SOIL/WASTE EXCAVATION: ON-SITE INCINERATION	• Feasible treatment technology • Complete thermal destruction of contaminated materials • On-site mobile incinerators have not been demonstrated on large-scale production basis for hazardous waste; no significant technical problems apparent. Two technologies evaluated were rotary kiln and infrared.	• Complies with remedial response objectives established for former lagoon and Kettle Pond areas	• Must comply with RCRA requirements • No future land use restrictions required	Rotary Kiln FL[3] KP[3] Infrared FL[3] KP[3]	 12,800,000 17,000,000 6,100,000 8,100,000

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[1] FL - Former Lagoon Area
[2] KP - Kettle Pond Area
[3] Costs refer to visible contamination soils clean-up criteria.
[4] Nocomonco Pond and Discharge Stream Area

TABLE 15
(Continued)

SUMMARY OF FEASIBILITY STUDY SCREENING OF REMEDIAL ALTERNATIVES

Remedial Alternatives	Evaluation Categories				
	Technical	Environmental/Public Health	Institutional/Land Use	Capital Cost FL[1]	(3)
5. BIODEGRADATION	• Infeasible treatment technology at this site • Concentrations of biodegradable PAH contaminants exceed desired limits • Lacks documentation of PAH degradation Biodegradation is eliminated from further evaluation based on: 1) high cost and length of duration for treatment of highly contaminated zones 2) unproven technology for PAH remediation 3) In general, carcinogenic constituents of creosote are non-biodegradable.	• Does not comply with remedial response objectives for the former lagoon and Kettle Pond areas. Soil/waste concentration could not be effectively reduced.	• Potential compliance problems	Alternative eliminated from further review.	
6. GROUND WATER CONTAINMENT BARRIER: SITE GRADING AND CAPPING -	a. Steel sheeting • Technically feasible to install • Potential failure due to corrosion • Potential leakage at joints • Eliminated from further consideration due to potential technical problems	• Eliminates direct contact and accidental ingestion exposure pathways • Would substantially meet Kettle Pond goal of improving ground water quality within service life	• Must comply with RCRA requirements • Land use restrictions required for surface capping area	Alternative eliminated from further review.	

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[1] FL - Former Lagoon Area
[2] KP - Kettle Pond Area
[3] Costs refer to visible contamination soils clean-up criteria.
[4] Hocomonco Pond and Discharge Stream Area

TABLE 15
(Continued)

SUMMARY OF FEASIBILITY STUDY SCREENING OF REMEDIAL ALTERNATIVES

Remedial Alternatives	Evaluation Categories				
	Technical	Environmental/Public Health	Institutional/Land Use	Capital Cost	
				ID[1]	($)
6. GROUND WATER CONTAINMENT BARRIER: SITE GRADING AND CAPPING (Cont.)	b. Grout Curtain • Technically difficult to install • Undemonstrated technology relative to hazardous waste containment • Verification of continuous curtain difficult • Highly limited applications • Eliminated from further consideration due to potential technical problem	• Eliminates direct contact and accidental ingestion exposure pathways • May not meet Kettle Pond goal of improving ground water quality	• Must comply with RCRA requirements • Land use restrictions required for surface capping area.	Alternative eliminated from further review.	
	c. Slurry Wall • Technically feasible • Demonstrated technology • Diverts/contains ground water flow through contaminated ground water and waste materials • Service life uncertain	• Would substantially meet Kettle Pond goal of improving ground water quality within service life • Eliminates direct contact and accidental ingestion exposure pathways	• Must comply with RCRA requirements • Land use restrictions required for surface capping area	KP	1,400,000
7. GROUND WATER PUMPING AND TREATMENT	• Ground water pumping acts to collect/contain contaminant plume prior to treatment • Demonstrated, conventional technology • Requires permanent operation				

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[1] FL - Former Lagoon Area
[2] KP - Kettle Pond Area
[3] Costs refer to visible contamination soils clean-up criteria.
[4] Hocomonco Pond and Discharge Stream Area

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TABLE 15
(Continued)

SUMMARY OF FEASIBILITY STUDY SCREENING OF REMEDIAL ALTERNATIVES

Remedial Alternatives	Evaluation Categories: Technical	Evaluation Categories: Environmental/Public Health	Evaluation Categories: Institutional/Land Use	ID[1]	Capital Cost ($)
Treatment Subalternatives	a. Sewage Treatment Plant (STP)			KP	200,000
	• Technically feasible but not extensively tested for performance • Removes contaminated ground water from site to STP for treatment • Bench-scale pilot studies required	• Prevents migration of contaminated ground water and provides for treatment of ground water • Eliminates direct contact and accidental ingestion exposure pathways by placing clean fill over Kettle Pond	• Must comply with RCRA and NPDES requirements • Land use restrictions required for Kettle Pond area		
	b. Granular Activated Carbon (GAC)			KP	470,000
	• Technically feasible • Proven technology in the treatment of PAHS • Reduces concentration of PAHs to low ppb levels	• Prevents migration of contaminated high level ground water and provides for treatment of ground water • Eliminates direct contact and accidental ingestion exposure pathways	• Must comply with RCRA and NPDES requirements • Land use restrictions required for Kettle Pond area		
	c. Transportation and Off-Site Treatment				
	• Technically infeasible, due to high daily volumes collected for off-site treatment and high costs This subalternative is eliminated from further evaluation on the basis of excessive cost and lack of implementability. Applicable for small quantities of leachate from sediment dewatering.	• Prevents migration of contaminated ground water and provides for treatment of ground water • Eliminates direct contact and accidental ingestion exposure pathways	• Must comply with RCRA requirements • Land use restrictions required for Kettle Pond area	Alternative eliminated from further review (except for sediment dewatering leachate collection).	

[1] FL - Former Lagoon Area
[2] KP - Kettle Pond Area
[3] Costs refer to visible contamination soils clean-up criteria
[4] Nocomonco Pond and Discharge Stream Area

TABLE 15
(Continued)

SUMMARY OF FEASIBILITY STUDY SCREENING OF REMEDIAL ALTERNATIVES

Remedial Alternatives	Evaluation Categories				
	Technical	Environmental/Public Health	Institutional/Land Use	Capital Cost ID[1]	Capital Cost ($)
8. GROUND WATER TABLE MODIFICATIONS	• Diverts uncontaminated ground water around contaminated zones, prevents ground water flow through contaminants • Requires frequent maintenance and monitoring for an indefinite time period This technology is eliminated from further consideration due to long-term operational requirements coupled with the fact that remedial response objectives are not met.	• Does not comply with remedial response objective for Kettle Pond (direct contact and accidental ingestion exposure pathways)	• Does not comply with RCRA requirements	Alternative eliminated from further review	
9. HYDRAULIC SEDIMENT DREDGING AND DISPOSAL/TREATMENT	• Feasible removal technology • Eliminates threat of sediment movement and/or desorption of sorbed organics • May increase initial suspension/ dispersion of contaminated sediments	• Complies with remedial response objectives established for Hocomonco Pond and discharge stream	• Must comply with regulatory requirements • No recreational use restrictions would be required for Hocomonco Pond	Dewatering Basin HP[4] Filter Press HP	 750,000 750,000
10. MECHANICAL SEDIMENT DREDGING AND DISPOSAL/ TREATMENT	• Feasible removal technology • Eliminates threat of sediment movement and/or desorption of sorbed organics • Minimizes suspension/dispersion of contaminated sediments (pond would be lowered to allow dredging in the dry)	• Complies with remedial response objectives established for Hocomonco Pond and discharge stream	• Must comply with regulatory requirements • No recreational use restrictions would be required for Hocomonco Pond	Dewatering Basin HP	 300,000

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[1] FL - Former Lagoon Area
[2] KP - Kettle Pond Area
[3] Costs refer to visible contamination soils cleanup criteria.
[4] Hocomonco Pond and Discharge Stream Area

TABLE 15
(Continued)

SUMMARY OF FEASIBILITY STUDY SCREENING OF REMEDIAL ALTERNATIVES

Remedial Alternatives	Evaluation Categories			Capital Cost	
	Technical	Environmental/Public Health	Institutional/Land Use	IO[1]	($)
11. CAPPING OF SEDIMENTS	• Feasible containment technology • Reduces threat of sediment movement and desorption of sorbed organics • Potential exists for breaching of cap • Potential for some leaching of contaminants from sediment to surface water in pond	• Complies with remedial response objectives established for Hocomonco Pond and discharge pond	• Must comply with regulatory requirements		200,000
12. NO ACTION	• Potentially feasible avoidance technology at some site contamination areas • Perimeter fencing acts to control direct exposure pathway • Does not treat or contain waste material	• Reduces threat of direct contact or accidental ingestion • Does not meet Kettle Pond goal of improving ground water quality	• Potential compliance problems		50,000

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[1] FL - Former Lagoon Area
[2] KP - Kettle Pond Area
[3] Costs refer to visible contamination soils clean-up criteria.
[4] Hocomonco Pond and Discharge Stream Area

TABLE 16

SUMMARY OF DETAILED EVALUATION OF ALTERNATIVES
FORMER LAGOON AREA

Remedial Alternatives	Evaluation Categories			Cost		
	Technical	Environmental/Public Health	Institutional/Land Use		CC($)[1]	PW($)[2]
1. SITE GRADING AND CAPPING STORM RELOCATION (FL-1)	• Effective response at this site • Useful life greater than 50 years • Reliable and well-demonstrated • Wastes not treated or destroyed • Remediation time is 4 months	• No significant short-term impacts • Meets environmental and public health response objectives	• Limits future development and deed restrictions required • RCRA compliance required		443,000	641,000
SOIL/WASTE EXCAVATION OFF-SITE LANDFILL DISPOSAL (FL-2)	• Effective response at this site • Permanent on-site solution • Reliable and well-demonstrated • Potential future problems at Off-site RCRA landfill • Two levels of soil removal criteria evaluated • Remediation time is 6 months	• Short-term potential air emissions can be monitored and mitigated • Meets environmental and public health response objectives	• Allows future development at site • RCRA compliance required	EA[3] VC[4]	5,033,000 6,040,000	5,191,000 6,229,000
3. SOIL/WASTE EXCAVATION ON-SITE LANDFILL FACILITY (FL 3)	• Effective response at this time • Useful life greater than 50 years • Long term reliability not demonstated - operational requirements relatively complex • Two levels of soil removal criteria evaluated • Remediation time is 7 months.	• Short term potential air emissions can be monitored and mitigated • Meets environmental and public health response objectives	• Limits future development and deed restrictions required • RCRA compliance required	EA[3] VC[4]	766,000 919,000	923,000 1,108,000
SOIL/WASTE EXCAVATION ON-SITE INCINERATION (FL-4)	• Effective response at this site, complete treatment of waste • On-site incineration not fully demonstrated • Permanent waste management solution • Two levels of soil removal criteria evaluated • Remediation time is 22 months	• Short term potential air emissions can be monitored and mitigated • Meets environmental and public health response objectives	• Allows future development at site • RCRA and Clean Air Act compliance	Rotary Kiln EA[3] VC[4] Infrared EA[3] VC[4]	 9,933,000 11,920,000 4,357,000 5,228,000	 10,090,000 12,109,000 4,514,000 5,417,000
NO ACTION (FL-5	• Will not prevent contaminant migration • No reliable, continued migration of contaminants to Hocomonco Pond	• Does not meet environmental response objectives • Public health response objective met with limitations	• Limits future development at site and deed restrictions required		24,000	213,000

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[1] CC = Capital Costs
[2] PW = Present Worth
[3] EA = Exposure Assessment Soil Clean-Up Criteria
[4] VC = Visibly Contaminated Soil Clean-Up Criteria

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SUMMARY OF DETAILED EVALUATION OF ALTERNATIVES
KETTLE POND AREA

Remedial Alternatives	Evaluation Categories Technical	 Environmental/Public Health	 Institutional/Land Use	Cost CC($)^{1}	 PW($)^{2}
1. SITE GRADING AND CAPPING (KP 1)	• Would not prevent contaminant migration • Useful life greater than 50 years • Wastes not treated or destroyed • Remediation is 4 months	• No significant short-term impacts • Does not meet environmental goal of improving ground water quality • Meets public health response objectives	• Limits future development and deed restrictions required • RCRA compliance required	366,000	564,000
2 SOIL/WASTE EXCAVATION: OFF-SITE LANDFILL DISPOSAL (KP-2)	• Effective response at this site • Requires specialized, demonstrated construction techniques for excavation • Permanent on-site solution • Reliable and well-demonstrated • Potential future problems at off-site RCRA landfill • Two levels of soil removal criteria evaluated • Remediation time is 8 months	• Short-term potential air emissions can be monitored and mitigated • Minor wetland impacts during construction (dewatering) • Meets environmental and public health response objectives	• Allows future development at site • RCRA compliance equired	STP EA^{3} 4,789,000 VC^{4} 8,209,000 GAC EA^{3} 4,856,000 VC^{4} 8,324,000	 4,899,000 8,398,000 4,966,000 8,513,000
3. SOIL/WASTE EXCAVATION: ON-SITE LANDFILL FACILITY (KP 3)	• Effective response at this site • Useful life greater than 50 years • Requires specialized demonstrated construction techniques for excavation • Long-term reliability not demonstrated - operational requirements relatively complex • Two levels of soil removal criteria evaluated • Remediation time is 8 months	• Short-term potential air emissions can be monitored and mitigated • Minor wetland impacts during construction (dewatering) • Meets environmental and public response objectives	• Limits future development and deed restrictions • RCRA compliance required	STP EA^{3} 772,000 VC^{4} 1,323,000 GAC EA^{3} 844,000 VC^{4} 1,446,000	 882,000 1,512,000 882,000 1,635,000
4. SOIL/WASTE EXCAVATION: ON-SITE INCINERATION FACILITY (KP-4)	• Effective response at this site, complete treatment of waste • On-site incineration not fully demonstrated • Permanent waste management solution • Two levels of soil removal criteria evaluated	• Short-term potential air emissions can be monitored and mitigated • Meets environmental and public health response objectives	• Allows future development at site • RCRA and Clean Air Act compliance required	Infrared: EA^{3,5} 4,339,000 VC^{4,5} 7,439,000 Rotary Kiln: EA^{3,5} 9,500,000 VC^{4,5} 16,285,000	 4,450,000 7,628,000 9,657,000 16,474,000

(Continued)

SUMMARY OF DETAILED EVALUATION OF ALTERNATIVES
KETTLE POND AREA

Remedial Alternatives	Evaluation Categories				Cost	
	Technical	Environmental/Public Health	Institutional/Land Use		CC($)[1]	PW($)[2]
5. GROUND WATER CONTAINMENT	• Effective response at this site • Useful life estimated at 50 years, not a permanent waste management solution • Wastes not treated or destroyed • Remediation time is 7 months	• No significant short-term impacts • Meets environmental goals and public health response and objectives for duration of useful life	• Limits future development and deed restrictions required • RCRA compliance required		1,281,000	1,517,000
6. GROUND WATER PUMPING AND TREATMENT (KP-6)	• Would prevent plume migration and provide for ground water treatment • GAC is demonstrated technology, complex operation and maintenance requirements • Treatment at Westborough STP may be feasible, bench scale/ pilot plant study required to verify treatment efficiency • Wastes not treated or destroyed and ground water treatment required on a permanent basis • Remediation time is 5 months	• No significant short-term impacts • Meets environmental goals for ground water quality improvement and public health response objectives • Potential long-term reduction to small wetland area contiguous to Hocomonco Pond due to lowering of ground water table	• Limits future development and deed restrictions required • RCRA and NPDES compliance required	GAC STP	408,000 174,000	1,068,000 814,000
7. NO ACTION (KP-7)	• Will not prevent ground water quality degradation	• Does not meet environmental goal for ground water quality improvement • Public health response objective met with limitation	• Limits future development at site and deed restrictions required		26,000	215,000

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[1] CC = Capital Costs
[2] PW = Present Worth
[3] EA = Exposure Assessment Soil Clean-Up Criteria
[4] VC = Visible Contamination Soil Clean-Up Criteria
[5] Cost presented are for GAC treatment.

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TABLE 18

SUMMARY OF DETAILED EVALUATION OF ALTERNATIVES
HOCOMONCO POND AND DISCHARGE STREAM AREA

Remedial Alternatives	Evaluation Categories				Cost
	Technical	Environmental/Public Health	Institutional/Land Use	CC($)[1]	PW($)[2]
. HYDRAULIC SEDIMENT DREDGING AND DISPOSAL/ TREATMENT (HP-1)	• Effective response at this site • Substantial quantity of water treatment required for sediment dewatering • Reliable and well demonstrated • Remediation time is 4 months	• Potential short term impacts to Hocomonco Pond aquatic life • Meets environmental and public health response objectives	• Future usage restrictions on Hocomonco Pond not required • RCRA and NPDES compliance required	HP-1A 725,000 HP-1B 716,000	725,000 716,000
. MECHANICAL DREDGING AND DISPOSAL/TREATMENT (HP-2)	• Effective response at this site • Reduced quantity of water treatment required from sediment dewatering reduced • Reliable and well-demonstrated • Remediation time is 4 months	• Potential short-term impacts to Hocomonco Pond aquatic life • Meets environmental and public health response objectives	• Future usage restrictions on Hocomonco Pond not required • RCRA and NPDES compliance required	280,000	280,000
3. CAPPING OF SEDIMENTS (HP-3)	• Effective response at this site • Reliable and well-demonstrated • Potential desorption of contaminants from sediments to surface water • Remediation time is 3 months	• Potential short-term impacts to Hocomonco Pond aquatic life • Meets environmental and public health response objectives	• Future usage restrictions on Hocomonco Pond not required • COE 404 permit required • Potential long-term leaching of contaminants from sediment to surface water	149,000	196,000
4. NO ACTION (HP-4)	• Sediment contamination would not be contained • Not reliable, contamination would continue to imigrate within and from Hocomonco Pond	• Does not meet environmental or public health response	• Continued restriction on pond usage requred objectives	-	-

[1] CC - Capital Costs
[2] PW - Present Worth

TABLE 19

SUMMARY OF DETAILED EVALUATION OF ALTERNATIVES
OTIS STREET AREA

Remedial Alternatives	Evaluation Categories			Cost	
	Technical	Environmental/Public Health	Institutional/Land Use	CC[1]	PW[2]
1. EMBANKMENT CAPPING (OS-1)	• Effective response technology • Useful life greater than 50 years • Reliable and well-demonstrated • Wastes not treated or destroyed • Remediation time is 3 months	• No significant short-term impacts • Prevents potential contaminant migration and potential ground water quality degradation • No other environmental or public health response objectives identified	• Deed restrictions required • RCRA compliance required	150,000	301,000
2. STORM DRAIN SEALING (OS-2)	• Effective response at this site • Useful life greater than 50 years • Reliable and well demonstrated • Wastes not treated or destroyed • Remediation time is 1 month	• No significant short-term impacts • Prevents potential contaminant migration in storm drain • There were no other environmental or public health response objectives identified	• Deed restrictions required • RCRA monitoring compliance required	44,000	186,000
3. NO ACTION (OS-3)	• No substantial contaminant migration detected to date • Alternative would monitor for future potential contamination problems	• Monitors for potential storm drain contaminant migration and for future potential ground water quality impacts • No other environmental and public health response objectives	• Deed restrictions required • RCRA monitoring required	5,000	146,000

[1] CC - Capital Costs
[2] PW - Present Worth

TABLE 20

DETAILED COST ESTIMATE
FORMER LAGOON AREA
SITE GRADING AND CAPPING; STORM SEWER RELOCATION (FL-1)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	–	$ 2,000
2. Field Offices	4 mo	1,000/mo	4,000
3. Decontamination	3 mo	1,000/mo	3,000
4. Improve Existing Access Roads	925 lf	25 lf	23,125
5. Construct New Access Roads	250 lf	50 lf	12,500
6. Site Grading (includes necessary soil excavation)	3,800 cy	4/cy	15,200
7. Clay	5,200 cy	12/cy	62,400
8. Synthetic Liner	7,600 sy	9/sy	68,400
9. Sand	2,600 cy	10/cy	26,000
10. Topsoil	1,500 cy	10/cy	15,000
11. Revegetation	7,600 sy	0.50/sy	3,800
12. Storm Sewer Relocation			
• Remove existing pipe, etc.	1,200 cy	20/cy	24,000
• 36-inch storm drain	600 lf	100/lf	60,000
13. Drainage Ditch	525 lf	10/lf	5,250
14. Health and Safety Cost	40 days	300/day[1]	12,000
SUBTOTAL			337,000
15. Engineering Fees and Permits @ 5 Percent			17,000
SUBTOTAL			354,000
16. Contingency @ 25 Percent			89,000
TOTAL CAPITAL COST			443,000

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[1] Unit cost includes Level C personnel protection for site grading and clay layer installation during capping. Also includes air monitoring.

TABLE 20
(Continued)

DETAILED COST ESTIMATE

FORMER LAGOON AREA
SITE GRADING AND CAPPING; STORM SEWER RELOCATION (FL-1)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring			20,000
Cap Maintenance			1,000
TOTAL ANNUAL O&M COST			21,000
PRESENT WORTH			641,000

TABLE 20
(Continued)

DETAILED COST ESTIMATE

FORMER LAGOON AREA
SITE GRADING AND CAPPING; STORM SEWER RELOCATION (FL-1)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring			20,000
Cap Maintenance			1,000
TOTAL ANNUAL O&M COST			21,000
PRESENT WORTH			641,000

TABLE 21

DETAILED COST ESTIMATE
FORMER LAGOON AREA
SOIL/WASTE EXCAVATION: OFF-SITE LANDFILL DISPOSAL (FL-2)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	–	2,000
2. Surface Water Drainage Facilities	Lump Sum	–	5,000
3. Excavation	23,000 cy	5/cy	115,000
4. Health and Safety Cost	48 days	500/day[1]	24,000
5. Analytical Soil Testing	50 samples	1,000/sample	50,000
6. Transportation	24,300 tons	75/ton	1,822,500
7. Disposal	24,300 tons	100/ton	2,430,000
8. Field Offices	6 mo	1,000/mo	6,000
9. Decontamination	3 mo	1,000/mo	3,000
10. Improve Existing Access Roads	925 lf	25/lf	23,125
11. Construct New Access Roads	250 lf	50/lf	12,500
12. Fill - Borrow Material	18,000 cy	5/cy	90,000
13. Topsoil	1,500 cy	10/cy	15,000
14. Revegetation	7,600 cy	0.50/sy	3,800
SUBTOTAL			4,602,000
15. Engineering Fees and Permits @ 5 Percent			230,000
SUBTOTAL			4,832,000
15. Contingency @ 25 Percent			1,208,000
TOTAL CAPITAL COST			6,040,000 (5,033,000)[2]

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[1] Unit cost for excavation includes Level B personnel protection and air monitoring.

[2] Costs for exposure assessment soil cleanup criteria.

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TABLE 21
(Continued)

DETAILED COST ESTIMATE
FORMER LAGOON AREA
SOIL/WASTE EXCAVATION: OFF-SITE LANDFILL DISPOSAL (FL-2)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring			20,000
PRESENT WORTH			6,229,000 (5,191,000)[2]

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[1] Unit cost for excavation includes Level B personnel protection and air monitoring.

[2] Costs for exposure assessment soil cleanup criteria.

TABLE 22

DETAILED COST ESTIMATE

FORMER LAGOON AREA
SOIL/WASTE EXCAVATION; ON-SITE LANDFILL FACILITY (FL-3)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	3,000
2. Field Offices	7 mo	1,000/mo	7,000
3. Decontamination	3 mo	1,000/mo	3,000
4. Improve Existing Access Roads	925 lf	25/lf	23,125
5. Construct New Access Roads	250 lf	50/lf	12,500
6. Excavation	18,000 cy	5/cy	108,000
7. On-Site Transportation	18,000 cy	2/cy	36,000
8. Surface Water Drainage Facilities	Lump Sum	-	5,000
9. Analytical Soil Testing	50 samples	1,000/sample	50,000
10. Landfill Construction	18,000 cy	21/cy[1]	378,000
11. Backfill Former Lagoon with Excavated Borrow from Landfill	18,000 cy	2/cy	36,000
12. Topsoil	1,500 cy	10/cy	15,000
13. Revegetation	7,600 sy	0.50/sy	3,800
14. Ground Water Monitoring Well Installation	160 lf	30/lf	4,800
15. Health and Safety Cost	30 days	500/day[2]	15,000
SUBTOTAL			700,000

---

[1] Unit cost breakdown of landfill from Table 28 (KP-3).

[2] Cost includes Level B personnel protection and air monitoring.

[3] Costs for exposure assessment soil cleanup criteria.

TABLE 22
(Continued)

DETAILED COST ESTIMATE

FORMER LAGOON AREA
SOIL/WASTE EXCAVATION; ON-SITE LANDFILL FACILITY (FL-3)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
16. Engineering Fees and Permits @ 5 Percent			35,000
SUBTOTAL			735,000
17. Contingency @ 25 Percent			184,000
TOTAL CAPITAL COST			919,000 (766,000)[3]
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring			20,000
PRESENT WORTH			1,108,000 (923,000)[3]

[1] Unit cost breakdown of landfill from Table 28 (KP-3).

[2] Cost includes Level B personnel protection and air monitoring.

[3] Costs for exposure assessment soil cleanup criteria.

TABLE 23

DETAILED COST ESTIMATE

FORMER LAGOON AREA
SOIL/WASTE EXCAVATION AND ON-SITE ROTARY KILN INCINERATION (FL-4A)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	2,000
2. Install Surface Water Drainage Facilities	Lump Sum	-	5,000
3. Excavation[1]	305 days	900/day	274,500
4. Health and Safety Cost			
• Excavation and Incineration	305 days	300/day[2]	91,500
5. Analytical Soil Testing	50 samples	1,000/sample	50,000
6. Site Utilities	Lump Sum	-	10,000
7. Incineration Cost	24,300 tons	350/ton	8,505,000
8. Field Offices	18 mo	1,000/mo	18,000
9. Decontamination	18 mo	1,000/mo	18,000
10. Improve Existing Access Roads	925 lf	25/lf	23,125
11. Construct New Access Roads	250 lf	50/lf	12,500
12. Refill - Incinerated Soil/Ash	18,000 cy	3/cy	54,000
13. Topsoil	1,500 cy	10/cy	15,000
14. Revegetation	7,600 sy	0.50/sy	3,800
SUBTOTAL			9,082,000

---

[1] Excavation performed as needed to run incinerator continuously. Thus, unit cost based on daily equipment rental, labor, and operating expenses.

[2] Unit cost includes Level B personnel protection during excavation and Level C during incineration. Also includes air monitoring during excavation.

[3] Cost for exposure assessment soil cleanup criteria.

TABLE 23
(Continued)

DETAILED COST ESTIMATE

FORMER LAGOON AREA
SOIL/WASTE EXCAVATION AND ON-SITE ROTARY KILN INCINERATION (FL-4A)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
15. Engineering Fees and Permits @ 5 Percent			454,000
SUBTOTAL			9,536,000
16. Contingency @ 25 Percent			2,384,000
TOTAL CAPITAL COST			11,920,000 (9,933,000)[3]
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring			20,000
PRESENT WORTH			12,109,000 (10,090,000)[3]

---

[1] Excavation performed as needed to run incinerator continuously. Thus, unit cost based on daily equipment rental, labor, and operating expenses.

[2] Unit cost includes Level B personnel protection during excavation and Level C during incineration. Also includes air monitoring during excavation.

[3] Cost for exposure assessment soil clean-up criteria.

TABLE 24

DETAILED COST ESTIMATE

FORMER LAGOON AREA
SOIL/WASTE EXCAVATION AND ON-SITE INFRARED INCINERATION (FL-4B)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	2,000
2. Install Surface Water Drainage Facilities	Lump Sum	-	5,000
3. Excavation[1]	305 days	900/day	274,500
4. Health and Safety Cost			
• Excavation and Incineration	305 days	300/day[2]	91,500
5. Analytical Soil Testing	50 samples	1,000/sample	50,000
6. Site Utilities	Lump Sum	-	10,000
7. Incineration Cost	24,300 tons	140/ton	3,402,000
8. Field Offices	22 mo	1,000/mo	22,000
9. Decontamination	18 mo	1,000/mo	18,000
10. Improve Existing Access Roads	925 lf	25/lf	23,125
11. Construct New Access Roads	250 lf	50/lf	12,500
12. Refill - Incinerated Soil/Ash	18,000 cy	3/cy	54,000
13. Topsoil	1,500 cy	10/cy	15,000
14. Revegetation	7,600 sy	0.50/sy	3,800
SUBTOTAL			3,983,000

[1] Excavation performed as needed to run incinerator continuously. Thus, unit cost based on daily equipment rental, labor, and operating expenses.

[2] Unit cost includes Level B personnel protection during excavation and Level C during incineration. Also includes air monitoring during excavation.

[3] Cost for exposure assessment soil cleanup criteria.

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TABLE 24
(Continued)

DETAILED COST ESTIMATE

FORMER LAGOON AREA
SOIL/WASTE EXCAVATION AND ON-SITE INFRARED INCINERATION (FL-4B)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
15. Engineering Fees and Permits @ 5 Percent			199,000
SUBTOTAL			4,182,000
16. Contingency @ 25 Percent			1,046,000
TOTAL CAPITAL COST			5,228,000 (4,357,000)[3]
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring			20,000
PRESENT WORTH			5,417,000 (4,514,000)[3]

---

[1] Excavation performed as needed to run incinerator continuously. Thus, unit cost based on daily equipment rental, labor, and operating expenses.

[2] Unit cost includes Level B personnel protection during excavation and Level C during incineration. Also includes air monitoring during excavation.

[3] Cost for exposure assessment soil cleanup criteria.

TABLE 25

DETAILED COST ESTIMATE

FORMER LAGOON AREA
NO ACTION (FL-5)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Fencing	1,650 lf	11/lf	18,150
2. Engineering Fees and Permits @ 5 Percent			1,000
SUBTOTAL			19,150
3. Contingency @ 25 Percent			4,850
TOTAL CAPITAL COST			24,000
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring			20,000
PRESENT WORTH			213,000

TABLE 26

DETAILED COST ESTIMATE

KETTLE POND
SITE GRADING & CAPPING (KP-1)

ITEM DESCRIPTION	QUANTITY	UNIT COST	TOTAL COST
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	$ 5,000
2. Field Offices	4 mo	1,000/mo	4,000
3. Decontamination	3 mo	1,000/mo	3,000
4. Improve Existing Access Roads	250 lf	25/lf	6,250
5. Construct New Access Roads	650 lf	50/lf	32,500
6. Backfill	7,200 cy	5/cy	36,000
7. Grading	7,200 cy	1/sy	7,200
8. Clay	4,800 cy	12/cy	57,600
9. Synthetic Liner	7,200 cy	9/cy	64,800
10. Sand	2,400 cy	10/sy	24,000
11. Topsoil	1,200 cy	10/cy	12,000
12. Revegetation	7,200 sy	0.50/sy	3,600
13. Drainage Ditch	750 lf	10/lf	7,500
14. Health and Safety Cost	40 days	300/day[1]	12,000
15. Ground Water Monitoring Well Installation	120 lf	30/lf	3,600
SUBTOTAL			279,000

---

[1] Unit cost includes Level C personnel protection for site grading and clay layer installation during capping. Also includes air monitoring.

TABLE 26
(Continued)

DETAILED COST ESTIMATE

KETTLE POND
SITE GRADING AND CAPPING (KP-1)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
16. Engineering Fees and Permits @ 5 Percent			14,000
SUBTOTAL			293,000
17. Contingency @ 25 Percent			73,000
TOTAL CAPITAL COST			366,000
ANNUAL OPERATING AND MAINTENANCE (O&M) COST			
Cap Maintenance			1,000
Water Quality Monitoring			20,000
TOTAL ANNUAL O&M COST			21,000
PRESENT WORTH			564,000

TABLE 27

DETAILED COST ESTIMATE

KETTLE POND
SOIL/WASTE EXCAVATION AND OFF-SITE LANDFILL DISPOSAL (KP-2)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	5,000
2. Sheet Piling	10,200 sf	9/sf	91,800
3. Pond Dewatering			
a. Well Installation	475 lf	30/lf	14,250
b. Associated Piping	250 lf	4/lf	1,000
c. Pumps	11	350/ea	3,850
d. Power and Maintenance[1]	Lump Sum	-	9,000
4. a. Connect to Sewage Treatment Plant (STP)			
• 8-inch sewer main	450 lf	70/lf	31,500
• Treatment (user fee)[2]	7,350,000 gal	0.0013/gal	9,600
b. Granular Activated Carbon (GAC)			
• Capital (0.05 MGD plant)	Lump Sum	-	110,000
• Operating	Lump Sum	-	20,000
5. Surface Water Drainage Facilities	Lump Sum	-	5,000
6. Excavation	24,000 cy	5/cy	120,000
7. Health and Safety Cost	80 days	500/day[3]	40,000
8. Analytical Soil Testing	50 samples	1,000/sample	50,000
9. Fill - Borrow Material	24,000 cy	5/cy	120,000

---

[1] Power cost based on $0.08 kwh for Westborough area and electric demand of 1.1 kw per pump. Dewatering operation runs 24 hours per day for duration of excavation (105 days - includes 2 weeks of dewatering prior to excavation). Maintenance includes operator for 2 hours per day.

[2] Estimate of $1.00/ccf based on user fees for sewage treatment plants of similar design.

[3] Unit cost includes Level B personnel protection during sheet piling and excavation. Also includes air monitoring.

TABLE 27
(Continued)

DETAILED COST ESTIMATE

KETTLE POND
SOIL/WASTE EXCAVATION AND OFF-SITE LANDFILL DISPOSAL (KP-2)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
10. Topsoil	1,200 cy	10/cy	12,000
11. Revegetation	7,200 sy	0.50/sy	3,600
12. Off-Site Transportation	32,400 tons	75/ton	2,430,000
13. Disposal	32,400 tons	100/ton	3,240,000
14. Field Offices	8 mo	1,000/mo	8,000
15. Decontamination	6 mo	1,000/mo	6,000
16. Improve Existing Access Roads	575 lf	25/lf	14,375
17. Construct New Access Roads	700 lf	50/lf	35,000
18. Ground Water Monitoring Well Installation	120 lf	30/lf	3,600
SUBTOTAL			
a. STP			6,254,000
b. GAC			6,342,000
19. Engineering Fees and Permits @ 5 Percent			
a. STP			313,000
b. GAC			317,000
SUBTOTAL			
a. STP			6,567,000
b. GAC			6,659,000

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TABLE 28

DETAILED COST ESTIMATE

KETTLE POND
SOIL/WASTE EXCAVATION AND ON-SITE LANDFILL DISPOSAL (KP-3)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	–	6,000
2. Sheet Piling	10,200 sf	9/sf	91,800
3. Pond Dewatering			
a. Well Installation	475 lf	30/lf	14,250
b. Associated Piping	250 lf	4/lf	1,000
c. Pumps	11	350/ea.	3,850
d. Power and Maintenance[1]	Lump Sum	–	5,000
4. a. Connect to Sewage Treatment Plant (STP)			
• 8-inch sewer main	450 lf	70/lf	31,500
• Treatment (user fee)[2]	4,900,000 gal	0.0013/gal	6,400
b. Granular Activated Carbon (GAC)			
• Capital (0.05 MGD plant)	Lump Sum	–	110,000
• Operating	Lump Sum	–	20,000
5. Surface Water Drainage Facilities	Lump Sum	–	5,000
6. Excavation and On-Site Transportation	24,000 cy	6/cy	144,000
7. Health and Safety Cost	60 days	500/day[3]	30,000
8. Analytical Soil Testing	50 samples	1,000/sample	50,000

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[1] Power cost based on $0.08 kwh for Westborough area and electric demand of 1.1 kw per pump. Dewatering operation runs 24 hours per day for duration of excavation (70 days - includes 2 weeks of dewatering prior to excavation). Maintenance includes operator for 2 hours per day.

[2] Estimate of $1.00/ccf based on user fees for sewage treatment plants of similar design.

[3] Unit cost includes Level B personnel protection during sheet piling and excavation. Also includes air monitoring.

TABLE 28
(Continued)

DETAILED COST ESTIMATE

KETTLE POND
SOIL/WASTE EXCAVATION AND ON-SITE LANDFILL DISPOSAL (KP-3)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
9. Improve Existing Access Roads	250 lf	25/lf	6,250
10. Construct New Access Roads	650 lf	50/lf	32,500
11. Field Offices	8 mo	1,000/mo	8,000
12. Decontamination	6 mo	1,000/mo	6,000
13. Landfill Excavation and Grading	22,000 cy	3.30/cy	72,600
14. Clay	4,200 cy	12/cy	50,400
15. Fine Sand	2,100 cy	12/cy	25,200
16. Synthetic Liner (2)	12,400 sy	9/sy	111,600
17. Leachate Collection	6,250 lf	2.5/lf	15,600
18. Leachate Storage (Tank, Piping)	20,000 gal	-	30,000
19. Leak Detection	6,250 lf	2.5/lf	15,600
20. Drainage Layer	2,100 cy	10/cy	21,000
21. Filter Fabric	6,200 sy	3/sy	18,600
22. Landfill Capping	6,200 sy	22.50/sy[4]	139,500
23. Backfill Kettle Pond with Excavated Landfill Material	24,000 cy	2/cy	48,000
24. Topsoil	1,200 cy	10/cy	12,000
25. Revegetation	7,200 sy	0.50/sy	3,600
26. Ground Water Monitoring Well Installation	160 lf	30/lf	4,800
SUBTOTAL			
a. STP			1,010,000
b. GAC			1,102,000

[4] Unit cost breakdown for cap from Table 26 .

TABLE 28
(Continued)

DETAILED COST ESTIMATE

KETTLE POND
SOIL/WASTE EXCAVATION AND ON-SITE LANDFILL DISPOSAL (KP-3)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
27. Engineering Fees and Permits @ 5 Percent			
a. STP			51,000
b. GAC			55,000
SUBTOTAL			
a. STP			1,061,000
b. GAC			1,157,000
28. Contingency @ 25 Percent			
a. STP			262,000
b. GAC			289,000
TOTAL CAPITAL COST			
a. STP			1,323,000 (772,000)[$]
b. GAC			1,446,000 (844,000)[$]
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
- Water Quality Monitoring			20,000
PRESENT WORTH			
a. STP			1,512,000 (882,000)[$]
b. GAC			1,635,000 (954,000)[$]

[$] Costs based on exposure assessment cleanup criteria.

TABLE 29

DETAILED COST ESTIMATE

KETTLE POND

SOIL/WASTE EXCAVATION AND ON-SITE ROTARY KILN INCINERATION (KP-4A)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	6,000
2. Sheet Piling	10,200 sf	9/sf	91,800
3. Pond Dewatering			
a. Well Installation	475 lf	30/lf	14,250
b. Associated Piping	250 lf	4/lf	1,000
c. Pumps	11	350/ea.	3,850
d. Power and Maintenance[1]	Lump Sum	-	5,000
4. a. Connect to Sewage Treatment Plant (STP)			
• 8-inch sewer main	450 lf	70/lf	31,500
• Treatment (user fee)[2]	4,900,000 gal	0.0013/gal	6,400
b. Granular Activated Carbon (GAC)			
• Capital	Lump Sum	-	110,000
• Operating	Lump Sum	-	20,000
5. Surface Water Drainage Facilities	Lump Sum	-	5,000
6. Site Utilities	Lump Sum	-	10,000
7. Excavation	25,000 cy	5/cy	125,000

---

[1] Power cost based on $0.08 kwh for Westborough area and electric demand of 1.1 kw per pump. Dewatering operation runs 24 hours per day for duration of excavation (70 days - includes 2 weeks of dewatering prior to excavation). Maintenance includes operator for 2 hours per day.

[2] Estimate of $1.00/ccf based on user fees for sewage treatment plants of similar design.

TABLE 29
(Continued)

DETAILED COST ESTIMATE

KETTLE POND
SOIL/WASTE EXCAVATION AND ON-SITE ROTARY KILN INCINERATION (KP-4A)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
8. Health and Safety Cost			
• Excavation	40 days	500/day[3]	20,000
• Incineration	405 days	200/day[4]	81,000
9. Analytical Soil Testing	50 samples	1,000/sample	50,000
10. Topsoil	1,200 cy	10/cy	12,000
11. Revegetation	7,130 sy	0.50/sy	3,600
12. Temporary Storage Area			
a. Excavation	31,000 cy	3.30/cy	102,300
b. Clay	3,000 cy	12/cy	36,000
c. Sand	3,000 cy	10/cy	30,000
d. Synthetic Liner	8,900 sy	9/sy	80,100
e. Leachate Collection	6,300 lf	2.50/lf	15,750
13. Leachate Collection Tank	20,000 gal	-	30,000
14. a. Transportation to Storage Area	24,000 cy	2/cy	48,000
b. Transportation from Storage Area to Incinerator	24,000 cy	1/cy	24,000
15. Incineration Cost	32,400 tons	350/ton	11,340,000
16. Ash/Incinerated Soil - Backfill Kettle Pond	24,000 cy	2/cy	48,000
17. Field Offices	29 mo	1,000/mo	29,000
18. Decontamination	24 mo	1,000/mo	24,000
19. Improve Existing Access Roads	250 lf	25/lf	6,250
20. Construct New Access Roads	650 lf	50/lf	32,500

[3] Unit cost includes Level B personnel protection and air monitoring.

[4] Unit cost includes Level C personnel protection.

TABLE 29
(Continued)

DETAILED COST ESTIMATE

KETTLE POND
SOIL/WASTE EXCAVATION AND ON-SITE ROTARY KILN INCINERATION (KP-4A)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
21. Ground Water Monitoring Well Installation	120 lf	30/lf	3,600
SUBTOTAL			
a. STP			12,316,000
b. GAC			12,408,000
22. Engineering Fees and Permits @ 5 Percent			
a. STP			616,000
b. GAC			620,000
SUBTOTAL			
a. STP			12,932,000
b. GAC			13,028,000
23. Contingency @ 25 Percent			
a. STP			3,233,000
b. GAC			3,257,000
TOTAL CAPITAL COST			
a. STP			16,165,000 (9,430,000)[$]
b. GAC			16,285,000 (9,500,000)[$]
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring			20,000
PRESENT WORTH			
a. STP			16,554,000 (9,657,000)[$]
b. GAC			16,474,000 (9,610,000)[$]

[$] Costs based on exposure assessment soil cleanup criteria.

TABLE 30

DETAILED COST ESTIMATE

KETTLE POND
SOIL/WASTE EXCAVATION AND ON-SITE INFRARED INCINERATION (KP-4B)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	6,000
2. Sheet Piling	10,200 sf	9/sf	91,800
3. Pond Dewatering			
a. Well Installation	475 lf	30/lf	14,250
b. Associated Piping	250 lf	4/lf	1,000
c. Pumps	11	350/ea.	3,850
d. Power and Maintenance[1]	Lump Sum	-	5,000
4. a. Connect to Sewage Treatment Plant (STP)			
• 8-inch sewer main	450 lf	70/lf	31,500
• Treatment (user fee)[2]	4,900,000 gal	0.0013/gal	6,400
b. Granular Activated Carbon (GAC)			
• Capital	Lump Sum	-	110,000
• Operating	Lump Sum	-	20,000
5. Surface Water Drainage Facilities	Lump Sum	-	5,000
6. Site Utilities	Lump Sum	-	10,000
7. Excavation	25,000 cy	5/cy	125,000

---

[1] Power cost based on $0.08 kwh for Westborough area and electric demand of 1.1 kw per pump. Dewatering operation runs 24 hours per day for duration of excavation (70 days - includes 2 weeks of dewatering prior to excavation). Maintenance includes operator for 2 hours per day.

[2] Estimate of $1.00/ccf based on user fees for sewage treatment plants of similar design.

TABLE 30
(Continued)

DETAILED COST ESTIMATE

KETTLE POND
SOIL/WASTE EXCAVATION AND ON-SITE INFRARED INCINERATION (KP-4B)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
8. Health and Safety Cost			
• Excavation	40 days	500/day[3]	20,000
• Incineration	405 days	200/day[4]	81,000
9. Analytical Soil Testing	50 samples	1,000/sample	50,000
10. Topsoil	1,200 cy	10/cy	12,000
11. Revegetation	7,130 sy	0.50/sy	3,600
12. Temporary Storage Area			
a. Excavation	31,000 cy	3.30/cy	102,300
b. Clay	3,000 cy	12/cy	36,000
c. Sand	3,000 cy	10/cy	30,000
d. Synthetic Liner	8,900 sy	9/sy	80,100
e. Leachate Collection	6,300 lf	2.50 lf	15,750
13. Leachate Collection Tank	20,000 gal	–	30,000
14. a. Transportation to Storage Area	24,000 cy	2/cy	48,000
b. Transportation from Storage Area to Incinerator	24,000 cy	1/cy	24,000
15. Incineration Cost	32,400 tons	140/ton	4,600,000
16. Ash/Incinerated Soil - Backfill Kettle Pond	24,000 cy	2/cy	48,000
17. Field Offices	29 mo	1,000/mo	29,000
18. Decontamination	24 mo	1,000/mo	24,000
19. Improve Existing Access Roads	250 lf	25/lf	6,250
20. Construct New Access Roads	650 lf	50/lf	32,500

---

[3] Unit cost includes Level B personnel protection and air monitoring.

[4] Unit cost includes Level C personnel protection.

TABLE 30
(Continued)

DETAILED COST ESTIMATE

KETTLE POND
SOIL/WASTE EXCAVATION AND ON-SITE INFRARED INCINERATION (KP-4B)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
21. Ground Water Monitoring Well Installation	120 lf	30/lf	3,600
SUBTOTAL			
a. STP			5,576,000
b. GAC			5,668,000
22. Engineering Fees and Permits @ 5 Percent			
a. STP			279,000
b. GAC			283,000
SUBTOTAL			
a. STP			5,855,000
b. GAC			5,951,000
23. Contingency @ 25 Percent			
a. STP			1,464,000
b. GAC			1,488,000
TOTAL CAPITAL COST			
a. STP			7,319,000 (4,269,000)[a]
b. GAC			7,435,000 (4,339,000)[a]
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring			20,000
PRESENT WORTH			
a. STP			7,508,000 (4,380,000)[a]
b. GAC			7,628,000 (4,450,000)[a]

---

[a] Costs based on exposure assessment soil cleanup criteria.

TABLE 31

DETAILED COST ESTIMATE

KETTLE POND
GROUND WATER CONTAINMENT BARRIER; SITE GRADING & CAPPING (KP-5)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	5,000
2. Field Offices	7 mo	1,000/mo	7,000
3. Decontamination	4 mo	1,000/mo	4,000
4. Improve Existing Access Roads	250 lf	25/lf	6,250
5. Construct New Access Roads	650 lf	50/lf	32,500
6. Backfill (including grading)	7,200 cy	5/cy	36,000
7. Clay	4,800 cy	12/cy	57,600
8. Synthetic Liner	7,200 sy	9/sy	64,800
9. Sand	2,400 cy	10/cy	24,000
10. Topsoil	1,200 cy	10/cy	12,000
11. Vegetation	7,200 sy	0.50/sy	3,600
12. Drainage Ditch	750 lf	10/lf	7,500
13. Health and Safety Cost	80 days	300/day[1]	24,000
14. Construct Soil Bentonite Slurry Wall	68,800 sf	10/sf	688,000
15. Ground Water Monitoring Well Installation	120 lf	30/lf	3,600
SUBTOTAL			976,000
16. Engineering Fees and Permits @ 5 Percent			49,000
SUBTOTAL			1,025,000

---

[1] Unit cost includes Level B personnel protection during sheet piling and slurry wall installation. Level C protection used during grading and clay layer installation for cap. Air monitoring performed as required.

TABLE 31
(Continued)

DETAILED COST ESTIMATE

KETTLE POND
GROUND WATER CONTAINMENT BARRIER; SITE GRADING & CAPPING (KP-5)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
17. Contingency @ 25 Percent			256,000
TOTAL CAPITAL COST			1,281,000
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Cap and Wall Maintenance			5,000
Water Quality Monitoring			20,000
TOTAL ANNUAL O&M COST			25,000
PRESENT WORTH			1,517,000

TABLE 32

DETAILED COST ESTIMATE

KETTLE POND
GROUND WATER PUMPING AND TREATMENT (KP-6A)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Wells	530 lf	30/lf	15,900
2. Pumps, Piping, and Holding Tank	Lump Sum	-	60,000
3. Site Clearing	Lump Sum	-	5,000
4. Concrete Pad	10 cy	200/cy	2,000
5. Storage House	Lump Sum	-	15,000
6. GAC Unit	Lump Sum	-	150,000
7. Fill Material	7,200 cy	5/cy	36,000
8. Grading	7,200 sy	1/sy	7,200
9. Topsoil	1,200 cy	10/cy	12,000
10. Revegetation	7,200 sy	0.50/sy	3,600
11. Ground Water Monitoring Well Installation	120 lf	30/lf	3,600
SUBTOTAL			310,000
12. Engineering Fees and Permits @ 5 Percent			16,000
SUBTOTAL			326,000
13. Contingency @ 25 Percent			82,000
TOTAL CAPITAL COST			408,000

Note: Included in the total capital costs estimates for Alternates KP-6 (A & B) are costs for grading and capping of the Kettle Pond.

TABLE 32
(Continued)

DETAILED COST ESTIMATE

KETTLE POND
GROUND WATER PUMPING AND TREATMENT (KP-6A)

ITEM DESCRIPTION	QUANTITY	UNIT COST - ($)	TOTAL COST ($)
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
1. Ground Water Pumping[1]			30,000
2. Treatment (including carbon disposal)			20,000
3. Water Quality Monitoring and Testing			20,000
TOTAL ANNUAL O&M COST			70,000
PRESENT WORTH			1,068,000

---

[1] Pumping cost includes power and maintenance. Power cost based on $0.08 kwh for Westborough area and electric demand of 1.1 kw per pump. Operation runs for 24 hours per day, 365 days per year. Maintenance includes operator for 2 hours per day.

TABLE 33

DETAILED COST ESTIMATE

KETTLE POND
GROUND WATER PUMPING AND TREATMENT (KP-6B)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	2,000
2. Wells	530 lf	30/lf	15,900
3. Pumps and Piping	Lump Sum	-	20,000
4. Connect to Sewage Treatment Plant			
• 8-inch sewer main	470 lf	70/lf	31,500
5. Fill Material	7,200 cy	5/cy	36,000
6. Grading	7,200 sy	1/sy	7,200
7. Topsoil	1,200 cy	10/cy	12,000
8. Revegetation	7,200 sy	0.50/sy	3,600
9. Ground Water Monitoring Well Installation	120 lf	30/lf	3,600
SUBTOTAL			132,000
10. Engineering Fees and Permits @ 5 Percent			7,000
SUBTOTAL			139,000
11. Contingency @ 25 Percent			35,000
TOTAL CAPITAL COST			174,000

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TABLE 33
(Continued)

DETAILED COST ESTIMATE

KETTLE POND
GROUND WATER PUMPING AND TREATMENT (KP-6B)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
1. Sewage Treatment Plant User Fee[1]	11,000,000 gal	0.0013/gal	15,000
2. Ground Water Pumping[2]			30,000
3. Maintenance			5,000
4. Water Quality Monitoring			20,000
TOTAL ANNUAL O&M COST			70,000
PRESENT WORTH			834,000

[1] Estimate of $1.00/ccf based on user fees for sewage treatment plants of similar design.

[2] Pumping cost includes power and maintenance. Power cost based on $0.08 kwh for Westborough area and electric demand of 1.1 kw per pump. Operation runs for 24 hours per day, 365 days per year. Maintenance includes operator for 2 hours per day.

TABLE 34

DETAILED COST ESTIMATE

KETTLE POND
NO ACTION (KP-7)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Fencing	1,500 lf	11/lf	16,500
2. Ground Water Monitoring Well Installation	120 lf	30/lf	3,600
SUBTOTAL			20,000
3. Engineering Fees and Permits @ 5 Percent			1,000
SUBTOTAL			21,000
4. Contingency @ 25 Percent			5,000
TOTAL CAPITAL COST			26,000
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring			20,000
PRESENT WORTH			215,000

TABLE 35

DETAILED COST ESTIMATE

HOCOMONCO POND AND DISCHARGE STREAM HYDRAULIC DREDGING OF SEDIMENTS AND DISPOSAL/TREATMENT (HP-1A)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
HOCOMONCO POND			
1. Site Clearing	Lump Sum	-	$ 2,000
2. Dewatering Basin	11,000 cy	11/cy[1]	121,000
3. Leachate Collection Tank (20,000 gal)	Lump Sum	-	30,000
4. Dredging	2,200 cy	35/cy	77,000
5. Leachate Treatment[2]	1,100,000 gal[3]	0.26/gal	286,000
6. Health and Safety Cost[4]	5 days	300/day	1,500
SUBTOTAL			518,000
DISCHARGE STREAM			
7. Site Clearing	Lump Sum	-	1,000
8. Construct New Access Road	450/lf	50/lf	22,500

---

[1] Cost derived from Temporary Storage Area (KP-4A).

[2] Cost includes transportation and treatment at an off-site wastewater treatment facility. Due to the volume of leachate to be treated, granulated activated carbon and discharge to sewage treatment plant are not feasible alternatives.

[3] Based on vendor information.

[4] Level B personnel protection during dredging.

TABLE 35
(Continued)

DETAILED COST ESTIMATE

HOCOMONCO POND AND DISCHARGE STREAM
HYDRAULIC DREDGING OF SEDIMENTS AND
DISPOSAL/TREATMENT (HP-1A)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
9. Diversion Channel Excavation and Backfill	890 cy	5/cy	4,450
10. Stream Sediment Excavation	100 cy	15/cy	1,500
11. Dewatering Basin	100 cy	11/cy	1,100
12. On-Site Transportation	100 cy	2/cy	200
13. Revegetation	1,000 sy	0.50/sy	500
14. Leachate Treatment[1]	4,000 gal	0.26/gal	1,100
15. Health and Safety[4]	5 days	300/day	1,500
SUBTOTAL			34,000
Total Hocomonco Pond and Discharge Stream			552,000
16. Engineering Fees @ 5 Percent			28,000
SUBTOTAL			580,000
17. Contingency @ 25 Percent			145,000
TOTAL CAPITAL COST			725,000
PRESENT WORTH			725,000

TABLE 36

DETAILED COST ESTIMATE

HOCOMONCO POND AND DISCHARGE STREAM
HYDRAULIC DREDGING OF SEDIMENTS AND
DISPOSAL/TREATMENT (HP-1B)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	$ 2,000
2. Dredging and Filter Pressing	2,200 cy	75/cy	165,000
3. Leachate Collection Tank (20,000 gal)	Lump Sum	-	30,000
4. Leachate Treatment[1]	1,100,000 gal	0.26/gal	286,000
5. Health and Safety[2]	95 days	300/day	28,500
6. Discharge Stream[3]	Lump Sum	-	34,000
SUBTOTAL			546,000
7. Engineering Fees @ 5 Percent			27,000
SUBTOTAL			573,000
8. Contingency @ 25 Percent			143,000
TOTAL CAPITAL COST			716,000
PRESENT WORTH			716,000

---

[1] Cost includes transportation and treatment at an off-site wastewater treatment facility. Due to the volume of leachate to be treated, GAC adsorption and discharge to sewage treatment plant are not feasible alternatives.

[2] Level B personnel protection during dredging and pressing.

[3] See Table 35 for detailed Discharge Stream dredging costs.

[4] Based on vendor information.

TABLE 37

DETAILED COST ESTIMATE

HOCOMONCO POND AND DISCHARGE STREAM MECHANICAL DREDGING OF SEDIMENTS AND DISPOSAL/TREATMENT (HP-2)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	2,000
2. Construct New Access Road	1,100 lf	50/lf	55,000
3. Pumping	25 days	200/day	5,000
4. Dredging	2,200 cy	15/cy	33,000
5. On-Site Transportation	2,200 cy	2/cy	4,400
6. Dewatering Basin	2,200 cy	11/cy	24,200
7. Leachate Collection Tank (20,000 gal.)	Lump Sum	-	30,000
8. Health and Safety[1]	5 days	300/day	1,500
9. Leachate Treatment[2]	90,000 gal	0.26/gal	23,400
10. Discharge Stream Cost[3]	Lump Sum	-	34,000
SUBTOTAL			213,000
11. Engineering Fees @ 5 Percent			11,000
SUBTOTAL			224,000
12. Contingency @ 25 Percent			56,000
TOTAL CAPITAL COST			280,000
PRESENT WORTH			280,000

---

[1] Level B personnel protection during dredging.

[2] Cost includes transportation and treatment at an off-site wastewater treatment facility. Volume based on estimate of sediment moisture content.

[3] See Table 35 for detailed Discharge Stream dredging.

TABLE 38

DETAILED COST ESTIMATE

HOCOMONCO POND AND DISCHARGE STREAM
CAPPING OF SEDIMENTS (HP-3)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	10,000
2. Construct New Access Road	700 lf	50/lf	35,000
3. Backfill	3,200 cy	5/cy	16,000
4. On-Site Transportation	3,200 cy	2/cy	6,400
5. Rip Rap	100 cy	21/cy	2,100
6. Pumping	30 days	200/day	6,000
7. Health and Safety[1]	10 days	300/day	3,000
8. Discharge Stream[2]	Lump Sum	-	34,000
SUBTOTAL			112,500
9. Engineering Fees @ 5 Percent			6,500
SUBTOTAL			119,000
10. Contingency @ 25 Percent			30,000
TOTAL CAPITAL COST			149,000
OPERATION AND MAINTENANCE (O&M) COST			
Surface Water Quality Monitoring			5,000
PRESENT WORTH			196,000

---

[1] Level C personnel protection.

[2] See Table 35 for detailed Discharge Stream dredging costs.

TABLE 39

DETAILED COST ESTIMATE

OTIS STREET
EMBANKMENT CAPPING (OS-1)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Site Clearing	Lump Sum	-	1,000
2. Health and Safety Cost	20 days	300/day[1]	6,000
3. Embankment Cap	4,400 sy	22.50/sy[2]	99,000
4. Field Offices	3 mo	1,000/mo	3,000
5. Decontamination	1 mo	1,000/mo	1,000
6. Ground Water Monitoring Well Installation	120 lf	30/lf	3,600
SUBTOTAL			114,000
7. Engineering Fees and Permits @ 5 Percent			6,000
SUBTOTAL			120,000
8. Contingency @ 25 Percent			30,000
TOTAL CAPITAL COST			150,000
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring			10,000
Cap Maintenance			1,000
Storm Drain Discharge Water Monitoring			5,000
TOTAL ANNUAL O&M COST			16,000
PRESENT WORTH			301,000

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[1] Unit cost includes Level C protection for site grading and clay layer placement. Also includes air monitoring as required.

[2] Unit cost breakdown for capping on Table 26 .

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TABLE 40

DETAILED COST ESTIMATE

OTIS STREET
STORM DRAIN SEALING (OS-2)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Storm Drain Pipe Sealing	1,025 lf	25/lf	25,625
2. Health and Safety Cost	20 days	200/day[1]	4,000
3. Ground Water Monitoring Well Installation	120 lf	30/lf	3,600
SUBTOTAL			33,000
4. Engineering Fees and Permits @ 5 Percent			2,000
SUBTOTAL			35,000
5. Contingency @ 25 Percent			9,000
TOTAL CAPITAL COST			44,000
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring[2]			
Storm Drain Discharge Water Quality Monitoring			5,000
TOTAL ANNUAL O&M COST			5,000
PRESENT WORTH			92,000

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[1] Level C personnel protection.

[2] Ground water quality monitoring at the Otis Street Area will be conducted as part of the Kettle Pond Area ground water quality monitoring program.

TABLE 41

DETAILED COST ESTIMATE

OTIS STREET
NO ACTION (OS-3)

ITEM DESCRIPTION	QUANTITY	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS			
1. Ground Water Monitoring Well Installation	120 lf	30/lf	3,600
2. Contingency and Engineering Fees			1,400
TOTAL CAPITAL COST			5,000
ANNUAL OPERATION AND MAINTENANCE (O&M) COST			
Water Quality Monitoring			15,000
PRESENT WORTH			146,000

Appendix B

Statement of Findings

Hocomonco Pond Site
Proposed Remedial Response Action
Former Lagoon Area

September 1985

In accordance with EPA policy and Executive Orders 11988 and 11990 concerning Floodplains and Wetlands, the following Statement of Finding has been prepared. The Statement of Finding is part of the Record of Decision (ROD) for the Hocomonco Pond Site and further serves to notify the general public and affected agencies that proposed remedial response actions for the former lagoon area are in or may potentially affect a base (100 year) floodplain and/or a wetlands. The Statement of Findings include the following:

1. The reasons why the proposed action must be located in or affect the floodplain or wetlands.

2. A description of significant facts considered in making the decision to locate in or affect the floodplain or wetlands including alternative sites and actions.

3. A statement indicating whether the proposed actions conforms to the applicable State or local floodplain protection standards.

4. A description of the steps taken to design or modify the proposed action to minimize potential harm to or within the floodplain or wetlands.

5. A statement indicating how the proposed action affects the natural or beneficial values of the floodplain wetlands.

The proposed remedial response action in the former lagoon area consists of site grading, capping and removal/relocation of the storm drain that passes along the east side of the former lagoon. The decision process leading to the selection of this action and a detailed discussion of the action and other alternative actions are documented in the ROD. The reason why the proposed action must be located in or affect a floodplain or wetlands is that the area of contamination and contaminant migration pathway is so located. The proposed site grading and capping actions are not located in a base (100 year) floodplain or wetlands; however, these actions could affect the same. Actions necessary to the removal/relocation of the storm drain are, for the most part, in an area such that the actions could affect the floodplain and wetlands. The removal/relocation action for a small section of the storm drain system, drain discharge channel, is located in a floodplain and wetland.

The decision to locate in or affect a floodplain and wetland was based on the fact the area of contamination and contaminant migration pathway is so located. The decision to propose remedial action in this area rather than take no action was based on the public health, welfare and environmental risks associated with this area of contamination. The health risks related to the accidental contact or ingestion of soil contaminated with hazardous chemicals, creosote compounds, was a significant factor considered in making this

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decision. The action related to the storm drain is considered necessary to protect the public health and environment. Migration of creosote compounds to Hocomonco Pond, via the storm drain, has had an adverse impact on the surface water and sediments in the pond and its discharge stream and presents a potential hazard to public health and the aquatic species in the pond. To reduce the potential health risk associated with contaminants in and migrating to the Hocomonco Pond, the pond has been closed to recreation. The proposed action would, coupled with other actions to be proposed for the pond itself (refer to the ROD, Hocomonco Pond and discharge stream), allow for future recreational use of the pond.

The proposed action in the former lagoon area is consistent with State (310 CMR 10.00 Parts I and III) and local floodplain standards.

Design and construction activities related to the implementation of the remedial response action proposed will include the best practical measures to minimize potential harm to or within the floodplain and wetlands. Initial design has considered the need to control adverse impacts; erosion, sediment and contaminant migration, both during construction and resulting from topographic and subsurface drainage changes necessary to the implementation of this action. Control measures will be considered in more detail during the final design phase of this action.

Using the best practical measures to control potential adverse impacts will reduce possible harm to the floodplain and wetlands from siltation and further degradation from contamination. Successful implementation of this action will eliminate the potential risk of groundwater contamination, surface water and sediment contamination in Hocomonco Pond and the discharge stream, potential adverse effects on aquatic species and will allow, when coupled with other proposed site actions, for the future recreational use of the pond.

Appendix C

Statement of Findings

Hocomonco Pond Site

Proposed Remedial Response Action

Kettle Pond Area

September 1985

In accordance with EPA policy and Executive Orders 11988 and 11990 concerning Floodplains and Wetlands, the following Statement of Finding has been prepared. The Statement of Finding is part of the Record of Decision (ROD) for the Hocomonco Pond Site and further serves to notify the general public and affected agencies that proposed remedial response actions for the former lagoon area are in or may potentially affect a base (100 year) floodplain and/or a wetlands. The Statement of Findings will include the following:

1. The reasons why the proposed action must be located in or affect the floodplain or wetlands.
2. A description of significant facts considered in making the decision to locate in or affect the floodplain or wetlands including alternative sites and actions.
3. A statement indicating whether the proposed actions conforms to the applicable State or local floodplain protection standards.
4. A description of the steps taken to design or modify the proposed action to minimize potential harm to or within the floodplain or wetlands.
5. A statement indicating how the proposed action affects the natural or beneficial values of the floodplain wetlands.

The proposed remedial response action in the Kettle Pond area consists of soil/waste excavation for disposal on-site in a landfill designed to RCRA standards. The decision process leading to the selection of this action and a detailed discussion of the action and other alternative actions are documented in the ROD.

The reason the proposed action must be located in or affect a floodplain or wetlands is that the area of contamination is so located. Most of the proposed excavation in Kettle Pond area is a wetland lying outside of the base (100 year) floodplain. However, the proposed action could potentially affect a floodplain area. The proposed excavation includes a small area lying within the base (100 year) floodplain and a wetland.

The decision to locate in or affect a floodplain and wetland was based on the fact the area of contamination is so located. The decision to propose remedial action in this area rather than take no action was based on the public health, welfare and environmental risks associated with this area of contamination. The health risks related to the accidental contact or ingestion of soil contaminated with hazardous chemicals, creosote compounds, was a significant factor considered in making this decision. The presence of groundwater contamination was also a significant factor considered. Excavation of the contaminants, located in groundwater, will facilitate remediation of ground water contamination.

The proposed action in the Kettle Pond area will be implemented in a manner consistent with State (310 CMR 10.00 Parts I and III) and local floodplain standards.

Design and construction activities related to the implementation of the remedial response action proposed will include the best practical measures to minimize potential harm to or within the floodplain and wetlands. Initial design has considered the need to control potential adverse impacts; erosion, sediment and contaminant migration, both during construction and resulting from any topographic and subsurface drainage changes necessary to the implementation of this action. Control measures will be considered in more detail during the final design phase of this action.

Using the best practical measures to control potential adverse impacts will reduce possible harm from siltation and further degradation from contamination to the floodplain and wetlands, which are adjacent to but not part of the area to be excavated. Successful implementation of this action will eliminate the potential health risks. Potential adverse effects on aquatic species in the Hocomonco Pond and discharge stream will also be addressed.

Although the proposed action could have potential adverse impacts in the short-term, the action provides for long-term benefits for the immediate wetland area and adjacent wetlands. Upon completion of the excavation, the wetland will be restored. Restoration of the wetland will include establishing necessary topographic conditions to assure proper surface water runoff and infiltration characteristics.

Appendix D

Statement of Findings

Hocomonco Pond Site

Proposed Remedial Response Action

Hocomonco Pond and Discharge Stream

September 1985

In accordance with EPA policy and Executive Orders 11988 and 11990 concerning Floodplains and Wetlands, the following Statement of Finding has been prepared. The Statement of Finding is part of the Record of Decision (ROD) for the Hocomonco Pond Site and further serves to notify the general public and affected agencies that proposed remedial response actions for the former lagoon area are in or may potentially affect a base (100 year) floodplain and/or a wetlands. The Statement of Findings will include the following:

1. The reasons why the proposed action must be located in or affect the floodplain or wetlands.
2. A description of significant facts considered in making the decision to locate in or affect the floodplain or wetlands including alternative sites and actions.
3. A statement indicating whether the proposed actions conforms to the applicable State or local floodplain protection standards.
4. A description of the steps taken to design or modify the proposed action to minimize potential harm to or within the floodplain or wetlands.
5. A statement indicating how the proposed action affects the natural or beneficial values of the floodplain wetlands.

The proposed remedial response action for Hocomonco Pond and discharge stream consists of mechanical dredging of contaminated sediments with on-site disposal. The decision process leading to the selection of this action and a detailed discussion of the action and other alternative actions are documented in the ROD.

The decision to locate in a floodplain and wetland was based on the fact the area of contamination is so located. The decision to proposed remedial action in this area rather than take no action was based on the public health, welfare and environmental risks associated with this area of contamination. The health risks related to the accidental contact or ingestion of sediments contaminated with hazardous chemicals, creosote compounds, was a significant factor considered in making this decision. To reduce the potential health risk associated with contaminants in Hocomonco Pond, the pond has been closed to recreation. The proposed action would, coupled with other actions propose for the storm drain (refer to the ROD, former lagoon area), allow for future recreational use of the pond.

The action proposed for the Hocomonco Pond and discharge stream is consistent with State (310 CMR 10.00 Parts I and III) and local floodplain standards.

Design and construction activities related to the implementation of the remedial response action proposed will include the best practical measures to minimize potential harm to or within the floodplain and wetlands. Initial design has considered the need to control potential adverse impacts; erosion, sediment and contaminant migration, both during construction and resulting from any topographic changes necessary to the implementation of this action. Control measures will be considered in more detail during the final design phase of this action.

Using the best practical measures to control potential adverse impacts will reduce possible harm from siltation and further degradation from contamination to the floodplain and wetlands, which are part of the area to be excavated. Successful implementation of this action will eliminate the potential health risks. Potential adverse effects on aquatic species in the Hocomonco Pond and discharge stream will also be addressed.

Although the proposed action could have potential adverse impacts in the short-term, the action provides for long-term benefits for the immediate wetland area and adjacent wetlands. Upon completion of the excavation, the wetland will be restored.

Appendix E

Statement of Findings

Hocomonco Pond Site

Proposed Remedial Response Action

Otis Street

September 1985

In accordance with EPA policy and Executive Orders 11988 and 11990 concerning Floodplains and Wetlands, the following Statement of Finding has been prepared. The Statement of Finding is part of the Record of Decision (ROD) for the Hocomonco Pond Site and further serves to notify the general public and affected agencies that proposed remedial response action for Otis Street is in or may potentially affect a base (100 year) floodplain and/or a wetlands. The Statement of Findings includes the following:

1. The reasons why the proposed action must be located in or affect the floodplain or wetlands.

2. A description of significant facts considered in making the decision to locate in or affect the floodplain or wetlands including alternative sites and actions.

3. A statement indicating whether the proposed actions conforms to the applicable State or local floodplain protection standards.

4. A description of the steps taken to design or modify the proposed action to minimize potential harm to or within the floodplain or wetlands.

5. A statement indicating how the proposed action affects the natural or beneficial values of the floodplain wetlands.

The proposed remedial response action for Otis Street consists of sealing the open-joint storm drain pipe that runs along the east side of the street. The decision process leading to the selection of this action and a detailed discussion of the action and other alternative actions are documented in the ROD.

The reason the proposed action must be located in or affect a floodplain or wetlands is that this section of Otis Street and contaminant migration pathway (storm drain pipe) are so located. The proposed actions are located in a base (100 year) floodplain and wetlands of the Assabet River. Activity necessary to the implementatio of the remedial action could affect the floodplain and wetlands.

The decision to locate in or affect a floodplain and wetland is based on the fact that Otis Street and the contaminant migration pathway are so located. The decision to propose remedial action in this area rather than take no action was based on the public health, welfare and environmental concerns. Potential adverse impacts to the public health, welfare and environment related to migration of hazardous chemicals to the Hocomonco Pond discharge stream surface water was a significant factor considered in making this decision. The remedial action will effectively provide adequate protection for public health and the environment.

The proposed action will, coupled with other actions proposed for the Hocomonco Pond site (refer to the ROD, Hocomonco Pond and discharge stream), will help ensure that a significant wetland is not adversely impacted by contamination.

The proposed action in the Otis Street area will be implemented in a manner consistent with State (310 CMR 10.00 Parts I and III) and local floodplain standards.

Design and construction activities related to the implementation of the remedial response action proposed will include the best practical measures to minimize potential harm to or within the floodplain and wetlands. Initial design has considered the need to control adverse impacts; erosion, sediment and contaminant migration during construction Control measures will be considered in more detail during the final design phase of this action.

Using the best practical measures to control potential adverse impacts will reduce possible harm to the floodplain and wetlands from siltation and further degradation by contamination.

APPENDIX F

KETTLE POND SOIL REMOVAL EVALUATION

The objective of Kettle Pond remediation is to preserve the quality of a groundwater resource for current and potential users by reducing soil and groundwater contamination to that which would result in groundwater quality at the property boundary not exceeding background quality, Maximum Contaminant Levels (MCL's) or Alternate Concentration Limits (ACL's).

The alternative recommended for remediation of the Kettle Pond contamination involves soil/waste excavation for on-site disposal. Groundwater is very shallow in the area of Kettle Pond and therefore the area will be dewatered by use of a well-point system before excavation. The effluent from this system will be treated via a Granular Activated Carbon (GAC) treatment system before discharging to Hocomonco Pond and the ground for recharge. Therefore, groundwater treatment will occur over the period of excavation.

The primary limits of soil excavation for this ROD have been chosen based on visual contamination criteria.

Following is a discussion of the rationale for this limit of excavation and for selection of additional incremental volumes of soil to be excavated (supplemental ROD) upon completion of visual contamination excavation and the Pond dewatering/groundwater treatment system. Additional excavation beyond visual contamination criteria will be based on an assessment of soil and groundwater contaminant types and concentrations present at that time.

The mobility and/or persistence of contaminants in the soil/groundwater influence the environmental fate of these contaminants. Within the soil/groundwater environment, various mechanisms take place that affect the characteristics, concentrations and behavior of the contaminants. Sorption onto soil particles, solubility, and degradation by soil microbes are major factors affecting contaminant concentrations. The factors affecting environmental fate are to some extent compound specific. The chemical and physical characteristic of a compound will influence the degree of adsorption, degradation and mobility.

Soil type and pH also influences the extent of sorption to soil particles. Table 3 and 4 are summaries of organic contamination at the Kettle Pond.

The organic contaminants present on-site generally have low solubilities and high adsorption (K_d) coefficients. However, some of the organic contaminants (e.g. benzene and napthalene, 2-4 methyl phenol and phenol) are highly soluble and have a low adsorption coefficients (K_d), making these the most mobile of contaminants below Kettle Pond.

Anthracene, fluoranthene, chrysene, benzo (a) anthracene and benzo (a) pyrene have very low solubilities and high adsorption capabilities resulting in little mobility of these chemicals in aquatic systems.

Data is limited on the specific contaminants and concentrations in the soil horizon immediately below visual contamination. However, this soil zone appears to be contaminated with contaminants with a range of solubilities from very low to high (e.g. napthalene and anthracene). Also, data on the composition of waste (visible contamination) in the Kettle Pond suggests that chemicals with a wide range of solubilities and adsorption capacities are present.

As would be expected, groundwater quality data downgradient of Kettle Pond detected mostly contaminants with high solubilities (e.g. benzene, phenol, and napthalene).

With additional soil testing and analysis we will further ascertain the chemical characteristics of the soil below visual contamination to determine if soluble contaminants are still present, which will contribute to future groundwater contamination.

Additional volumes of soil, beyond the visual level, will be excavated if it is determined that this is necessary to reduce groundwater contamination to acceptable levels. Part of this evaluation will take into account the effect of the dewatering system on groundwater contamination and whether excavation or further operation of the system is the cost effective method to reach the groundwater protection goal.

If it is determined that the contaminants present can be cost effectively flushed from the soil and treated in groundwater through the existing GAC system no additional soil excavation beyond visual contamination will be necessary and the groundwater treatment system will be continued.

RESPONSIVENESS SUMMARY FOR THE HOCOMONCO POND SITE

I. Introduction

This responsiveness summary for the Hocomonco Pond Site documents for the public record concerns and issues raised during remedial planning, comments raised during the comment period on the Feasibility Study, and the response of EPA and the State to those concerns.

II. Concerns Raised Prior to the Feasibility Study Comment Period

The following community relations activities were undertaken to solicit comments from and inform interested parties of the Feasibility Study process:

- The Community Relations Plan for the Hocomonco Pond Site was prepared by EPA in August 1983. Prior to a field investigation of the site, EPA contracted with NUS Corporation which subcontracted locally to TRC Environmental Consultants, Inc., to perform a Remedial Investigation/Feasibility Study (RI/FS) for assessment and remediation of contamination at the site.
- A press release announcing a public meeting on the work plan for the Remedial Investigation was sent out in January of 1984.
- Information repositories were established at the Westborough Town Hall and the Public Library in January of 1984.
- The Remedial Action Master Plan (RAMP) and Detailed RIFS Work Plan were sent to the information repositories in January 1984.
- A public meeting was held Wednesday, February 15, 1984, to discuss EPA's involvement in the site and proposed response actions.
- Periodic contact between Board of Health and Remedial Project Manager to update progress and plans.

- A press release announcing public informational meeting on remedial investigation and public hearing on the feasibility study was sent out.

Community interest in the Hocomonco Pond Site dates back to 1976, when the former lagoon area was breached during installation of a storm sewer which discharges to the Pond. In the summer of 1980, town officials were notified by a resident about an oily discharge from the storm sewer drainage pipe (Community Relations Plan for Remedial Investigation and Feasibility Study at the Hocomonco Pond Site, August 1983). The site was proposed for inclusion on the National Priorities List (NPL) in December of 1982.

Three main issues were raised by local officials and citizens during the RI/FS phase and prior to the public comment period for the site. These were

- Concern about the threat of groundwater contamination, which would have the potential for affecting the Otis Street municipal well, was expressed by local residents and local officials.

- Local fisherman expressed displeasure over the loss of a recreational resource by the closure of the pond to fishing.

- Concern was expressed by Smith Valve Company representatives over the lack of technical information about the site which would conclusively rule out the potential liability of Smith Valve Company, a major employer in the area.

As part of the site remedial investigations EPA tested groundwater in the vicinity of the Otis Street well and tested the wellwater itself. The results of these tests indicated that the Otis Street well is free of contaminants. EPA also conducted a literature search on Commonwealth of Massachusetts sponsored research on the fish population in Hocomonco Pond. Although results linking declines in fish populations with the creosote contamination were inconclusive, use of the pond was restricted for the safety of the local residents. Finally, in response to Smith Valve Company concerns over potential liability, EPA stated that the contamination problem appeared to be the

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result of wood-treating operations from the Montan Treating Company and American Lumber and Treating Company. This does not, however, rule out the potential for liability of Smith Valve Company.

III. Concerns Raised During the Feasibility Study Comment Period

The final RI/FS was released to the public on July 1, 1985. Copies of the report were placed at the Westborough Town Hall and Public Library. A copy of the report was also sent to the Smith Valve Company.

A public meeting was held on July 1, 1985, at the Westborough Town Hall at 7:00 PM for the purpose of explaining the RI/FS. Present at the meeting were Jim Ciriello, Site Project Officer of the EPA Superfund Branch; Bruce Marshall, an EPA geologist; Debra Prybyla, Public Affairs Manager of the EPA Superfund Branch and Patty D'Andrea, EPA project liaison. From the Commonwealth of Massachusetts, Department of Environmental Quality Engineering was project engineer Joe Ellis. From NUS Corporation, EPA's prime consultant on the project were Ken Byrd, Matt Soltis and Jane Holderman. Representing TRC, Environmental Consultants, Inc., NUS's sub-contractor, were Bill Beck, Paul Burgess and Scott Friedman. Approximately 20 people attended the meeting and asked a series of questions pertaining to site activities. An eight-page fact sheet on the RI/FS and the various alternatives was distributed at the meeting.

A public hearing was held at the Westborough Town Hall on July 10, 1985 at 7:00 PM to officially receive comments related to the FS and remedial action from the community. Testimony provided at the meeting was recorded by a stenotypist. Merrill Hohman, Director of the EPA Waste Management Division of Region I, chaired the meeting. Also in attendance from EPA was Jim Ciriello, Site Project Officer; from the Massachusetts Department of Environmental Quality Engineering was project engineer Joe Ellis; from NUS Corporation was Geoff McGean. Testimony was provided by 2 town officials, 5 citizens, 1 state official, and 1 representative of a potentially responsible party (PRP). The comment period was extended to July 24, 1985.

The health risk assessment was submitted to the Town and PRP's for review on September 4, 1985. At this time EPA opened a new comment period which ended September 25, 1985, to allow the public to review this new information with respect to alternatives presented in the feasibility study.

What follows are a series of tables that list community, State and PRP concerns by topic type.

Index to Community Comments

1. Offsite Disposal (EPA)
2. Hocomonco Pond Dredging (EPA)
3. Otis Street Capping (EPA)
4. Future Responsibilities (EPA)
5. Stability of Contamination Levels (NUS/TRC)
6. Ongoing Monitoring of Otis Street Well (NUS)
7. Period of Testing (EPA)
8. Safety of Pond for Human Use (NUS)
9. Drinking Water Quality (NUS)
10. Testing Prior to NPL Listing (EPA)
11. Reverse Runoff (NUS/TRC)
12. EPA Involvement (EPA)
13. Westborough Liability (EPA)
14. Onsite Disposal (EPA)
15. Storm Sewer (EPA)
16. Water Drainage System Effects (EPA)
17. Site Fencing (EPA)

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Community Concern	Response
1. **Offsite Disposal** The Westborough Board of Selectmen support removal (and disposal) of the materials from the Former Lagoon and Kettle Pond Areas by the most cost-effective means. One local citizen is concerned about the amount of material that would have to be moved.	What is estimated to be 10,000 cubic yards of waste material in the Former Lagoon will not be removed. Monitoring well data immediately downgradient of the Former Lagoon indicate that it is not currently a source of groundwater contamination. Since groundwater contamination is not currently occuring, the appropriate remedial response is to cap the area to ensure groundwater contamination does not occur in the future. A cap will be an effective control to protect public health, welfare, and the environment. The storm drain which passes next to the Former Lagoon will be relocated to prevent future contaminant migration, via the drain, to the surface water and sediments of Hocomonco Pond. What is estimated to be approximately 24,000 cubic yards of waste material in the Kettle Pond area will be excavated and disposed of in an on-site landfill located next to the Former Lagoon. The on-site landfill will be constructed to accept waste from the Hocomonco Pond site only. These remedial actions are considered the most cost-effective remedies for the conditions at this site. "Cost-effective" as used in discussions of superfund remedial alternatives is defined by 300.68(i) of the National Contingency Plan to mean "the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, or the environment."

Community Concern	Response
2. **Hocomonco Pond Dredging** The Board of Selectmen support the use of mechanical dredging. They conclude that hydraulic dredging would have the potential for contaminating the Town's water supply from the Otis Street Well.	The U.S. Environmental Protection Agency also supports the use of mechanical dredging of contaminated sediments from Hocomonco Pond.

Community Concern	Response
3. Otis Street Capping The capping of the Otis Street embankment would be acceptable to the town if the health and safety of the local residents can be ensured and the cost of monitoring is borne by some other party.	Capping of the east embankment of Otis Street is not considered the most cost-effective remedy for this area. The selected remedy, sealing of the storm drain, will meet the public health and environmental response objectives by preventing contaminant migration into the open-joint drainage system and subsequent discharge of contamination to surface water in the Hocomonco Pond discharge stream. The cost of monitoring would normally be the responsibility of the State if the project is funded by the Superfund; however, depending on the outcome of negotiations and/or litigation with potential responsible parties (PRPs), the PRPs could be liable for the cost of monitoring. The subject of responsibility/liability is addressed in greater detail in the response to Community Comment Item 4, future responsibilities.

Community Concern	Response
4. Future Responsibilities The Board of Selectmen included the following eight questions regarding the town's liability in the event of future problems at the site:	The liabilities of the Town of Westborough for the Hocomonco Pond site would arise from their ownership and operation of the storm drain running from Smith Parkway into Hocomonco Pond. Section 107 of CERCLA states that the owner and operator of a facility is liable for all costs incurred at a Superfund site consistent with the National Contingency Plan. This plan is set out at 40 C.F.R Part 300. Thus, if a court were to determine that the Town was liable under the Superfund act, the Town could be held liable for costs of responding to hazardous substances at the site. If the Town were not found to be liable by a court, the following answers would response to questions 4a - f.
a. Who would pay for the monitoring costs in the future? With State and Federal budget cuts, changes in administration, etc., funds might dry up to monitor the site.	a. Before remedial construction is initiated at a Superfund site, EPA and the State enter into a contract wherein the State assures that it will provide all necessary operation and maintenance for the expected useful life of the remedial action. Monitoring is typically considered an operation and maintenance responsibility assumed by the State. With respect to adequate funding for monitoring, the State is required to provide as part of the contract an operation and maintenance plan that addresses the source of funding for its responsibilities.
b. Who would be responsible for any future contamination caused by any number of reasons, including natural disasters, natural processes, vandalism, etc.?	
c. Who would be responsible for replacement of the containment systems, including the caps, lining of onsite disposal area, etc.?	
d. Who would be responsible if the designed systems failed to provide the necessary protection of the environment?	
e. Who would be responsible if future Federal or State regulations should require that the hazardous waste contained on this site be removed and incinerated, or the like?	
f. Who would be responsible for future potential health problems that are undetected because of present technology?	

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Community Concern	Response
4. **Future Responsibilities** (Cont'd.)	
g. Who would be responsible for the added costs to the Town under any scenario; i.e., increased cost of insurance, police protection, loss of insurance coverage, testing of wells, etc.?	b, c and d. All Superfund sites in the country have been placed on the National Priorities List on the basis of the threat they pose to public health, welfare and the environment. So long as a site remains on the list, it would legally be eligible for monies from the Superfund for necessary future remedial activities.
h. What happens and who pays if conditions at the site change; i.e., higher water tables, etc.?	e. EPA has taken the position that CERCLA remedial actions are not legally subject to the requirements of other federal and state environmental statutes, but that as a matter of policy, the Agency will select alternatives that meet relevant and applicable federal standards.
	f. See answers to b, c and d above.
	g. Increased costs to the Town would, under the current Superfund legislation, be borne by the Town.
	h. See answers to b, c and d above.

Community Concern	Response
5. Stability of Contamination Levels A local citizen on the Westborough Conservation Commission inquired about the stability of the contamination problem. Is the situation stable or is it getting worse?	The former lagoon area consists of soil contamination as a result of historic waste disposal practices. The source area is generally stable, however, contaminant migration does occur through the storm dain into Hocomonco Pond following heavy rainfall. The Kettle Pond soil contamination is not stable in terms of the ongoing contaminant leachate production and the resulting groundwater contamination downgradient of the area. The Otis Street area appears stable. However, trace levels of groundwater contamination were detected. The contaminated sediments appear relatively stable in Hocomonco Pond. Water quality within the pond was free of contaminants. The creosete compounds have chemical properties whereby they are generally highly absorbed to sediments, and therefore relatively immobile. During high flow conditions, erosion of contaminated sediments could occur causing further downstream migration. Some sediment transport downstream also occurs under normal conditions which may result in continued contaminated sediment transport downstream.

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Community Concern	Response
6. Ongoing Monitoring of Otis Street Well	
A local resident asked whether or not ongoing monitoring of the Otis Street Well will be discussed in the final remedial action plan.	Based on the results of the hydrogeological investigation, it has been determined that there is no potential for contaminant migration into the well. Further, there is no potential for future contamination assuming that the well continues pumping at its present rate. Addition of supplies wells in that area may change flow conditions and equifer response and the connections to Hocomonco Pond would have to be assessed at that time. Continued water quality monitoring at the Otis Street well as well as the effects of constructing additional supply wells in that area would necessarily be addressed under the Massachusetts Water Supply Guidelines.

Community Concern	Response
7. Period of Testing A citizen questioned why "it (took) so long" to determine the areas of contamination if (all the) testing was done between 1967 and 1980.	Creosote, buried on-site, was discovered during the construction of the 36" storm drain from Smith Parkway in 1976. Subsequent to that discovery, several studies were conducted by the State and private parties on-site (refer to Community Comment No. 10). These studies were conducted over the period of time from 1971 to 1982. The EPA became involved in June 1982, during the site evaluation conducted as part of the site ranking process for eligibility for superfund status. The site was ranked in October 1982, according to hazards identified and the potential health threat related to those hazards. As a result of the ranking, the site was proposed for inclusion on the National Priorities List (Superfund sites) in December 1982. The site was included on the NPL as the Hocomonco Pond Site. The EPA conducted a general site inspection in January 1983. A more detailed site survey was conducted for the EPA by the NUS Corporation, Field Investigation Team, in May 1983. The site inspection and survey provided the information to determine the scope of the Remedial Investigation and Feasibility Study conducted during the period of February 1984 through the spring of 1985. It is clear from the preceding discussion that all the testing was not done between 1967 (1976?) and 1980. The reason "it took so long" is that the process the EPA must follow (defined by the National Contingency Plan 40 C.F.R. Part 300) is

Community Concern	Response
7. 'Period of Testing' (Cont'd.)	very detailed and comprehensive. This process is necessary to ensure that the extent and character of the problem are properly defined in order to select an appropriate and comprehensive remedial response.

Community Concern	Response
8. Safety of Pond for Human Use	
A citizen questioned what criteria were used to determine the Pond to be safe for public swimming. A related question was set forth regarding the length of time it would take to clean up the "area".	Prior to initiation of this study, the Pond had already been posted as a no-swimming area. Therefore, the study proceded from the standpoint that the pond had previously been determined to be unfit for swimming by the Westborough Board of Health. It has been determined that an actual health risk associated with coming in direct contact (i.e., dermal, inhalation, ingestion) with the contaminated substances does exist. Through implementing the remedial action involving mechanical dredging of the contaminated sediment, recreational restrictions concerning public use could be removed in the future. This action would be effective and permanent since the source(s) of contamination would be eliminated through remedial actions at the former lagoon and Kettle Pond areas.

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Community Concern	Response
9. Drinking Water Quality A citizen asked for recommendations regarding the utility of the Otis Street Well in the event that Hocomonco Pond is not cleaned up. There was concern about the safety of water usage in the area. Finally, the citizen asked if EPA would recommend the water resources as suitable for human consumption.	The Otis Street Well is currently being used. Additionally, testing performed at the Otis Street Well detected no organic contaminant. Therefore, it is considered as currently safe for human use/consumption. However, the groundwater in the Kettle Pond Area is not recommended for human consumption since it is contaminated. The risks involved with such use are presented in the Risk Assessment section of the Feasibility Study. (Such use is not taking place at the present time.) Under present pumping conditions the Otis Street well does not draw water from Hocomonco Pond or the areas southeast of it (Kettle Pond). As previously noted, construction of additional wells in the existing Otis Street well area may change groundwater flow into that area and the effects of this would be evaluated at that time.

Community Concern	Response
10. Testing Prior to NPL Listing	
A citizen inquired about the names and dates of testing to determine the water resource (Otis Street well) is fit for human consumption prior to EPA involvement at the Hocomonco Pond site. It is assumed then the citizen wanted record of the agency (e.g., Commonwealth) or firm name.	Several studies were conducted at the Hocomonco Pond Site prior to U.S. EPA involvement. The companies involved and the purpose of the studies are listed below: July and August 1971 and August 1982 - Massachusetts Department of Environmental Quality Engineering (DEQE) sampled fish from the Hocomonco Pond to evaluate stock density, reproduction and bioaccumulation of chemicals by fish. November 1979 and 1982 - Massachusetts Division of Fisheries and Wildlife investigated fish kills in Hocomonco Pond. 1980 - Flynn Engineers, Inc. was retained by Smith Valve Company, Inc. to locate the source of creosote and to study the feasibility of relocating the storm drainage pipe. September 1981 - Whitman and Howard, Inc. prepared a report, the Westborough Ground Water Resource Management Study, describing the town's hydrogeology and ground water resources. This study included work related to Otis Street well and its development. June 1982 - The EPA became involved during the site evaluation conducted as a part of the site ranking process. The site was ranked in October 1982 and proposed for inclusion on the National Priority List (Superfund sites) in December 1982.

Community Concerh	Response
10. Testing Prior to NPL Listing (Cont'd.)	July and August 1982 - Massachusetts Department of Environmental Quality Engineering (DEQE) sampled the oily faction of the storm drain discharge and water from the pond outlet. October 1982 - Flynn Engineers, Inc. completed another study of the Hocomonco Pond site. This study addressed the past history and proposed a method of determining and removing and/or containing creosote on the site.

Community Concern	Response
11. Reverse Runoff	
A citizen was concerned about "reverse" runoff from the Hocomonco Pond site affecting other areas.	All surface water runoff from the site itself flows into Hocomonco Pond. Therefore, "runoff from the site" is not regarded as a pathway for migration to other adjacent properties. Please see response to related question number five under Community Concerns.
(It is unclear if "reverse runoff" refers to surface runoff (overland flow) or to "induced infiltration" of Hocomonco Pond water into the Otis Street well. Both are responded to here.)	As discussed in the response to Comment No. 9, the Otis Street well under present operating conditions does not induce water from Hocomonco Pond. However, increases in pumping rates may alter conditions and the amount of induced infiltration would have to be evaluated at that time.

Community Concern	Response
12. EPA Involvement A citizen questioned when EPA became involved in the "exploration", i.e., remedial activities, in the area.	Refer to Item 7.

Community Concern	Response
13. Westborough Liability A citizen questioned what the cost to the Westborough taxpayer would be to clean up the area.	The cost (if any) to the taxpayers in the Town of Westborough cannot be determined at this time. Since the town has been named as a potentially responsible party, it is possible that the town may have some financial liability. This matter will be addressed in negotiations or litigation with the U.S. EPA. The result of the negotiations and subsequent effect on the taxpayers cannot be assessed at this time.

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Community Concern	Response
14. Onsite Disposal The Selectmen expressed concern that on-site disposal area would be constructed to receive waste from other sites as well as Hocomonco Pond site waste.	The alternatives presented in the FS which utilize on-site disposal are for waste from this site only. A landfill would be designed and constructed on the site according to standards set forth in the Resource Conservation and Recovery Act (RCRA) to dispose of only waste from this site.

Community Concern'	Response
15. Storm Sewer A Selectman raised the concern that the Smith Parkway Storm Sewer, which was installed in 1976 passes by the Former Lagoon area, is only a minimal contributor to contamination in the Pond, while operations at the site were putting (substantial quantities of) waste in the pond during operations 50 years ago.	Objectives of the remedial investigation were to determine the types, locations and extent of contamination that exists today, past, present and future migration of contamination and fate of this contamination. Information on historical use of the site was obtained early in the planning process to develop a field investigation program based on historical site use and disposal practices. Indeed, each area that was previously used for disposal was characterized. We recognized that waste were put in the Pond during operations 40 - 60 years ago but also find the Smith Parkway storm sewer is a route of present and future potential releases if not addressed.

Community Concern	Response
16. **Water Drainage System Effects** A commentor stated that the long-term contamination of the Hocomonco Pond would have broader effects on the entire water drainage system.	The effort to address the contamination at the source will affect the quality of the water in the Hocomonco Pond and any other water bodies for which it is a tributary in the future. Effects on downstream water of the past pollution problems associated with Hocomonco Pond cannot be addressed under the scope of the present action.

Community Concern	Response
7. Site fencing	
A citizen believes that there are few possible effects upon health from contaminants in Hocomonco Pond, and suggested fencing the pond as an alternative to excavation.	Refer to PRP comments, items 7 and 10, Risk Assessment Data and Potential Contaminant Exposure. Fencing of Hocomonco Pond itself would not adequately address the adverse environmental impacts on Hocomonco Pond.

Index to State Comments

1. Economic Burden (EPA)

State Comments	Response
1. Economic Burden	
A representative of State Senator John Houston stated that the Senator is opposed to the idea that the Town of Westborough should shoulder any significant amount of financial burden.	The financial burden to the town relative to the town's status as a potentially responsible party (PRP) has yet to be determined. The town's financial burden will be determined either by negotiations with the EPA and other PRPs, or through litigation.

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Index of PRP Comments

1. Offsite Disposal - Former Lagoon (EPA)
2. Offsite Disposal - Kettle Pond (EPA)
3. Hocomonco Pond Capping (EPA)
4. Otis Street Remedial Action (EPA)
5. Unjustifiable Alternatives (EPA)
6. Factual Inaccuracies (NUS/TRC)
7. Risk Assessment Data(EPA)
8. Cost-Effective Remedial Action (EPA)
9. Deletion of State as PRP (EPA)
10. Potential Contaminant Exposure (EPA)
11. Potential Use of Contaminated Groundwater (EPA)
12. Validity of Risk Assessment (EPA)

PRP Comments	Response
1. Offsite Disposal - Former Lagoon In general the potentially responsible parties (PRPs) are opposed to offsite disposal. For the Former Lagoon Area it was argued that storm sewer relocation would be a sufficient remedy. This alternative was justified on the basis that there was no groundwater contamination detected in this area. They argued that the natural bed of "relatively impervious... sludges and slaked fines" serve as an adequate barrier to migration of contaminants. A second PRP recommended both storm sewer relocation and site grading and capping for the Former Lagoon Area. This recommendation was made on the basis that this was the only alternative that dealt directly with the storm sewer. The PRP did however, note some ambiguity in the FS as to the contribution the storm sewer was making to the overall levels of contamination.	The U.S. EPA does not advocate off-site disposal of the wastes in the Former Lagoon. The remedial response action selected for the Former Lagoon is site grading and capping with relocation of the storm drain which is a migration route for contamination entering Hocomonco Pond.

PRP Comments	Response
2. Offsite Disposal - Kettle Pond In general, the PRPs are opposed to offsite disposal of contaminated materials from the Kettle Pond Area. Either a no-action or site capping alternative was recommended. This was based on the fact that the "principal migration route of site contaminants...is from the Former Lagoon Area and not Kettle Pond". Furthermore, PRPs argue that since 40 years have passed with no apparent groundwater contamination (even though the FS is ambiguous on this point), a long-term threat is not indicated. Consequently, capping would be sufficient to attain the objective of reducing the potential for direct contact. This theory is consistent with one PRP's objection to a remedial response objective to reduce the limited groundwater contamination associated with the Kettle Pond Area. The PRP argues that the objective does not follow from the summary risk assessment and it therefore serves no public health function.	The U.S. EPA does not advocate off-site disposal of contaminated materials from the Kettle Pond. The selected remedial response action includes excavation of contaminated materials from Kettle Pond and on-site disposal in a properly designed landfill. This alternative has been selected to address a condition which includes a source of contamination in direct contact with groundwater and contaminated groundwater. Groundwater contamination is documented; the FS is not ambiguous on this point. Refer to the FS for data on water quality monitoring well no. 4 (shallow and deep). Addressing the groundwater problem in the Kettle Pond area is based on EPA's responsibility to provide adequate protection of the public health, welfare and environment. "Environment" by definition under the statute and the National Contingency Plan includes groundwater. Thus no public health threat needs to exist to justify groundwater protection. Site capping or no-action would not adequately address the effect of contamination on the environment.

PRP Comments	Response
3. Hocomonco Pond Capping PRP recommendations for Hocomonco Pond remedial actions are to take "no action" or to "cap" the sediments. They argue that the costs of dredging are unjustifiable in the "absence of a conclusive demonstration that the pond sediments create a hazard that requires control". They argue that since there is no evidence of contaminants in the water of the pond itself, no risk of direct contact would be presented. One PRP goes on to state that if EPA does not choose either the "no action" or the "capping" alternative, mechanical dredging would be the least "undesirable" of the two remaining alternatives.	The U.S. EPA does not recommend the "no action" or "capping: remedial alternatives. Dredging is justified to eliminate the hazard of exposure (direct contact) and future potential migrations to contaminated sediments. Direct contact could occur by wading in the area of contaminated sediments. An increased risk of exposure, via ingestion and inhalation, would exist if agitation of contaminated sediments resulted in contamination of the surface water and the release of volatile organic compounds. Clean-up of the Hocomonco Pond would in the future allow for the reopening of the pond to recreation, i.e., swimming and fishing. It would also improve the environment for aquatic species in the pond. The selected remedy for Hocomonco Pond is to remove contaminated sediments by mechanical dredging.

PRP Comments	Response
4. Otis Street Remedial Action	
PRPs recommend a "no action" alternative for the Otis Street embankment. This recommendation is made on the basis that there are no identified exposure pathways. It is added that, if a remedy other than "no action" is selected, the storm drain sealing would be the preferred alternative because of its lower cost.	The selected remedy for Otis Street (east side) is storm drain sealing. The objective of this action is to prevent contamination from entering the open-jointed drainage pipe and discharging to surface waters in the pond discharge stream.

PRP Comments	Response
5. Unjustifiable Alternatives One PRP listed a series of unjustifiable alternatives, which included the following: a. Excavation for Offsite Disposal b. Excavation for Onsite Incineration c. Excavation for Onsite Landfill Facility d. Groundwater Containment Barrier e. Groundwater Pumping and Treatment f. Hydraulic Sediment Dredging and Disposal/Treatment The grounds for objections to these alternatives were based on cost-effectiveness and/or the adequacy of the technology in question. At issue with respect to the landfill alternative is a potential "taking" of property of the Smith Valve Company.	The U.S. EPA would agree that alternatives defined in Item 5, points a,b,d, and f may not be the optimal choices for site remediation. The agency would disagree with the position that excavation and disposal in an on-site landfill facility, point c and groundwater pumping and treatment, point e, is unjustifiable as it relates to the alternatives proposed for remedial action in the Kettle Pond Area. Kettle Pond contamination will be excavated and disposed of on-site in a properly designed landfill. This alternative is considered a cost-effective remedy for the problem in the Kettle Pond Area. The on-site landfill would involve the use of property owned by the Smith Valve Company. Waste material from other sites would not be disposed of in any facility constructed on the Hocomonco Pond Site. As detailed in the Record of Decision, the on-site landfill is necessary to meet environmental objectives and is the cost-effective remedy for the Kettle Pond materials.

PRP Comments	Response
6. Factual Inaccuracies Two issues were called factually inaccurate by a PRP. First, the recognition of creosote in 1976 at the drain outlet preceded the listing of the 23-acre National Priorities List (NPL) site by several years. The PRP seems to be concerned both by an alleged ambiguous reference to the boundaries of the NPS site and by the time (1982) at which it was notified that its property posed a pollution problem for the Hocomonco Pond.	The report summarizes the chronology of site activities beginning with the first reported site contamination following storm sewer construction. Regulatory implications of the site history were not discussed nor implied.
A second inaccuracy cited the dimensions of the site. The PRP wanted to document that the Smith Valve Manufacturing Plant was distinct from the Hocomonco Pond Superfund Site. The PRP stated that a portion of its property is, however, included within the boundaries of the Superfund Site.	The Remedial Investigation report was amended to note that the Smith Valve Manufacuring Plant site is not within the boundaries of the Superfund site. The Superfund site does include all the identified contamination areas and the locations of past site operations.

PRP Comments	Response
7. Risk Assessment Data A PRP has evaluated EPA's risk assessment and feels that it deals too much with calculations without enough objective considerations of site conditions and risks. The PRP is concerned that the criteria used for selection of non-carcinogenic critical contaminants is somewhat arbitrary. The PRP also feels that, given EPA's list of critical contaminants, there are uncertainties associated with analytical data in the risk assessment, and that there has been no attempt to account for these uncertainties. Possible exposure of the public to site contaminants has been overestimated.	EPA believes that given the level of toxicological data on site contaminants and the existing data base, the Risk Assessment presents a reasonable evaluation of hazard characterization, dose-response assessment, exposure assessment and risk assessment. EPA recognizes that there is always uncertainty associated with site analytical data and toxicological data, especially with respect to non-carcinogenic compounds. EPA disagrees that the Risk Assessment overstates possible exposure of the public to site contaminants.

PRP Comments	Response
8. Cost-Effective Remedial Action A PRP raised the issue that the remedial action must be cost-effectively tailored to the degree of risk found at the site. The PRP believes that the Risk Assessment supports their earlier recommendations for cost-effective remedial alternatives and is concerned that implementation of any of the more expensive remedies presented in EPA's RI/FS (remedial investigation and feasibility study) would violate both the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and EPA's National Contingency Plan, which require implementation of a cost-effective remedy.	The final Risk Assessment sets forth calculated human health risks based on available site data and existing literature. The feasibility study discusses environmental threats of source contamination at the site. EPA's remedial objective is to protect public health, welfare, and the environment. The agency has determined that the selected alternatives are both cost-effective and necessary for adequate protection of public health, welfare, and the environment.

PRP Comments	Response
9. Deletion of State as PRP	
A PRP objected to the EPA's deletion of the Commonwealth of Massachusetts as a potentially responsible party at the site. The PRP alleges that as owner of Hocomonco Pond, the state is properly a PRP.	The Commonwealth of Massachusetts is the Trustee of Hocomonco Pond. Identification of PRPs is an exercise of enforcement discretion. Recent law suggests Trustee Ownership may not be a valid justification for liability under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

PRP Comments	Response
0. Potential Contaminant Exposure A PRP questions the validity of frequency assumptions and figures used in scenarios of children contacting or ingesting muck or dry soil. The PRP further states that even if there was exposure, it could be curtailed by fencing the site and/or providing security.	Since fencing is clearly needed and is recommended, but continuous security beyond that is infeasible for the long term. Fencing and security will, in fact, relieve the threats of human contact with or ingestion of waste only if 100 percent effective, but it does nothing for future groundwater contamination.

PRP Comments	Response
11. Potential Use of Contaminated Groundwater A PRP believes that the use of contaminated groundwater from Kettle Pond is speculative and that no current exposure exists from this groundwater contamination.	It is true that there are prsently no users of contaminated groundwater. Only constant, longterm monitoring and aquifer use restrictions will ensur no future use of this contaminated groundwater. The assumption of potential future use is valid. The Comprehensive Environmental Response, Compensat and Liability Act authorizes EPA, in its remedial actions, to protect the environment groundwater, an water supplies. This authority is in addition to t protection of public health.

PRP Comments	Response
12. Validity of Risk Assessment A PRP states that the Risk Assessment incorporates invalid assumptions concerning frequency and risk of fishing and swimming in the Pond, since use of Pond is restricted by posting, and there is currently limited surface water contaminations. Further, relocation of the Smith Parkway storm sewer which discharges to the Pond will eliminate contamination in Hocomonco Pond sediments.	Hocomonco Pond sediments are contaminated, the Pond is used for fishing even though the Pond is posted. Swimmers may contact contaminated sediments which exist in the pond and will not be addressed as a results of relocating the storm sewer.

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Public Comment Period

The public comment period started on July 1, 1985 with the release of the RI/FS. During that time an 8-page fact sheet was prepared and distributed, a Public Informational Meeting was held on July 1, 1985, and a Public Hearing was held July 10, 1985. Written comments could be submitted until July 24, 1985. Three letters were received in support of testimony given at the Public Hearing. These were from:

- Senator John Houston.
- The Board of Selectmen of the Town of Westborough, Massachusetts.
- Koppers Company, Inc., Science and Technology, a PRP.
- Stephen D. Anderson, Esq., on behalf of Smith Valve Company, Inc.
- Walter Ward, Citizen.

The issues and concerns raised in these letters were summarized in the preceding discussion.

A supplemental public comment period was conducted between September 4 and September 25, 1985 to allow comment on the selection of alternatives as they relate to the health risk assessment released to the public September 4, 1985.

One letter was reviewed at that time from

- Virginia and Robert Otto, Citizens.

Remaining Concerns

A policy concern raised by both officials from the Town of Westborough and by State Senator John Houston was the issue of financial burden for the cleanup operation. Both parties were opposed to shifting the burden of payment for capital costs and operation and maintenance costs to the town.

A concern raised by Raymond E. Welsh, Town Selectman, was the potential liability of American Oil, a national contractor.

Finally, an issue raised by Stephen D. Anderson, Esq., on behalf of Smith Valve Company, Inc. was the fact that EPA had not released the section of the RI that deals with "Public Health and Environmental Concerns" (RI, Section 6.0) during the public comment period. He stated that "Smith Valve objects to the requirement that public comments be submitted prior to the release of this section of the study."